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BOARD OF PUBLIC WORKS

DULUTH, MINN.

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YEAR ENDING

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TENTH

ANNUAL REPORT

OF THE

Board of Public Works,

CITY OF DULUTH, MINN.,

For the Year Ending February 28. 1897.

1897.
STAR PUBLISHING CO.,
DULUTH.

BOARD OF PUBLIC WORKS,

ORGANIZED MARCH 30, 1887.

Guy Wells	1887	President
F. B. Edwards (a)	1887, 1888, 1889	
Philip Westaway	1887, 1888, 1889	
Miron Bunnell	1888, 1889, 1890	President
George Rupley (b)	1890	
W. W. Davis (c)	1890, 1891	
Nils Nilson	1890, 1891, 1892, 1893	
Henry Truelsen	1891, 1892, 1893	President
James Farrell	1892, 1893, 1894	
A. Swordling	1894, 1895	
M. J. Davis	1894, 1895, 1896	President
W. B. Welles (d)	1895	
D. A. Reed (e)	1896	
C. W. Wilson	1896	

(a) Resigned, March 31, 1890.

(b) Appointed to fill vacancy caused by resignation of F. B. Edwards. Resigned, April 28, 1890.

(c) Appointed to fill vacancy caused by resignation of George Rupley.

(d) Resigned, February 10, 1896.

(e) Appointed to fill vacancy caused by resignation of W. B. Welles.

MEMBERS AND OFFICERS

OF THE

Board of Public Works.

MEMBERS.

M. J. Davis	Term Expires March, 1897
D. A. Reed	Term Expires March, 1898
C. W. Wilson	Term Expires March, 1899

OFFICERS.

President	M. J. Davis
Clerk of the Board	R. Murchison
City Engineer	W. B. Patton
Prin. Assistant Engineer	E. J. Duffies

Report of Board of Public Works.

Office of the Board of Public Works,
City of Duluth, March 1, 1897.

To the President and Common Council of the City of Duluth:

Gentlemen:

In compliance with the provisions of the city charter, the Board of Public Works of the City of Duluth herewith respectfully presents the Tenth Annual Report of its official acts for the year ending February 28, 1897.

In order to be in possession of the details of all work under control of the department, and for the purpose of facilitating the business of the public with the Board, the oversight of one particular department was assigned to each member, and under this arrangement direct supervision of construction work was assumed by Mr. Reed, maintenance by Mr. Wilson, with the President in attendance at the office. This division of labor, although not accompanied by a division of responsibility, was to some extent successful in meeting the purposes for which it was adopted.

The most important work in the line of construction was the water works, and the subject is treated at length in the report of the City Engineer and the accompanying report of L. W. Rundlett, consulting engineer.

The appropriation asked for Maintenance was $60,000 and the expenditure was about $54,000 notwithstanding the exceptionally large outlay required for repairs after the extensive washouts in May. In connection with this division of the work, the following recommendations by the member directly in charge are indorsed by the Board:

The discontinuance of street sweeping and cleaning by contract, and the performance of the work by days labor under direction of the street foremen;

The replacement of all worn out wooden gutters by rough stone gutters at the expense of the abutting property;

The extension of the First avenue east storm sewer to the lake;

The construction of storm sewers in Tenth and Twelfth avenues east from Superior street to Fifth street;

The construction of a storm sewer outlet in Eighteenth avenue west from Superior street to Railroad alley;

The extension of the Nineteenth avenue west storm sewer by the St. Paul & Duluth Railroad company across their righ-of-way;

Increasing the height of the brick sewer in Michigan street about 18 inches between Twentieth and Twenty-second avenues west to make it possible to work in the sewer when the water is high in the lake;

And the extension of the right of way for railroad street from its present terminus to Garfield avenue.

The necessary preliminaries to the building of a wooden viaduct on the line of Tenth avenue west from Piedmont avenue to Railroad street are now completed, the railroad companies interested, with the exception of the Duluth Transfer Railway company, whose affairs are in the hands of a receiver, having granted right-of-way for the structure across their property and having also agreed to pay their proportionate share of the cost.

We respectfully invite your careful perusal of the accompanying reports of sub-departments and the various exhibits attached thereto.

M. J. DAVIS,
D. A. REED,
C. W. WILSON,
Board of Public Works.

ANNUAL REPORT

——OF THE——

CLERK OF THE BOARD,

——FOR THE——

FISCAL YEAR ENDING FEBRUARY 28, 1897.

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Report of the Clerk of the Board.

DULUTH, MINN., March 1, 1897.

To the Board of Public Works:

GENTLEMEN:

Herewith I submit a report of the work done in the public works department, and of the expenditures involved, for the year ending February 28, 1897, including such incidental work done under authority of the Board of Park Commissioners as is authorized by the city charter.

A statement of the net disbursements for the year on all accounts will be found in Exhibit "A."

CONTRACTS.

Four contracts for the grading of streets were made and the work completed at a total cost of $2,493.09. It was found impracticable to do any work within the year under a contract signed November 16, 1896, for the paving of Pine and Arthur avenues, the estimated cost of which is $9,564.00.

Two contracts for the construction of sanitary sewers were authorized and the work completed at a cost of $576.84.

Eight contracts were let in connection with water works construction all of which are now in progress. The estimated cost of these at contract prices is $369,728.17.

Twenty-two contracts for the construction of wooden sidewalks were let and the total cost of the completed work was $2,956.34.

Twenty-one contracts appear under the heading "Miscellaneous," representing an outlay of $20,399.60. Among these are six for street sprinkling carried through at a cost of $3,750.65.

Exhibits "B" "C" "D" "E" and "F," summarized as follows, contain information in detail regarding contracts:

Grading, paving, etc	$ 576 84
Street sprinkling	3,750 65
Street sweeping	1,720 97
Wooden sidewalks	2,956 34
Waterworks	369,728 17
Miscellaneous	14,927 98
Total amount of work contracted	$405,698 04

ASSESSMENTS.

Among the special assessments made and confirmed during the year were two for improvements designed and carried out by the Board of Park Commissioners. One of these, amounting to $10,184.15. was for the purpose of reimbursing the city in part for the cost of acquiring by purchase, for park purposes, the following lands, to-wit: Block 117, Portland division; blocks 98, 106, 110, 114, 115, 117, 118 and lots 1, 2, 3, 4, 5, 6, 12, 13, 14, 15 and 16, in block 111, Endion division. The property was acquired by the Board of Park Commissioners in 1891 at a cost of $50,607.42, and is now known as Garfield Park. Several previous efforts to secure the assessment of a larger portion of the cost against property deemed to have been specially benefited were unsuccessful, and the matter of this assessment has been under consideration in one form or another for the past five years.

The other assessment referred to, amounting to $915.00, was levied to defray the cost of planting trees in the parkway spaces on both sides of Superior street from Eighth aveuue east to Twenty-second avenue east. Exhibits "E," "G," "H," "I" and "J," of which the following is a summary, relate to assessments:

Grading, paving, etc	$11,14 548
Sanitary sewers	2,291 61
Sidewalks	2,956 34
Street sprinkling	3,750 65
Miscellaneous	11,099 15
Total assessments	$31,282 29

In addition to the above, final assessments, amounting to $12,795.50, for improvements made by the former Village of Lakeside were prepared under direction of, and confirmed by, the common council. See Exhibit "J."

CITY BUILDINGS.

All work in connection with the building of the combined market house and armory was done in this year, the cost being as follows:

Foundation and Superstructure—contract price		$16,400 00
Extras and changes:		
Face brick substituted for common	$ 650 00	
Steel substituted for wood in beams and columns	1,630 00	
Galvanized steel substituted for comman iron in roof	225 00	
Addition of gallery	498 00	
Addition of boiler room in basement	1,677 00	
		4,680 00
Steam heating		3,317 00
Plumbing		1,836 00
Wiring and electric light fixtures		805 60
Total		$27,038 60

The foundation walls for the pump house at Lakewood were finished at a cost of $9,024.33.

Alterations were made in the interior arrangements of the town hall at Lakeside and the police station at West Duluth at a total cost of $76.94. An iron cage formerly in use at Lakeside was removed to the city and erected in police headquarters at a cost of $84.50, the purpose being to afford a separate place of confinement for youthful prisoners.

STREET LIGHTING.

The expense of lighting streets for the year was as follows:

Duluth, including Lakeside and West Duluth	$50.415 90
New Duluth and Fond du Lac	3,808 20
Park Point	300 00
Total	$54 524 10

an increase of $1,029.65 over last year.

CONDEMNATIONS.

Below is given a list of streets on which easements for slopes have been acquired during the year through condemnation, proceedings, and the total amount awarded for damages in each case:

Both sides of Palm street from Arlington avenue to west line of Duluth Heights, Fifth Division	$ 421 98
Both sides of Orange street from Highland avenue to west line of Duluth Heights, Fifth Division	368 22
Both sides of Seventh alley from Fifth avenue east to Sixth avenue east	25 84
Both sides of New street from Seventeeth avenue west to Eighteenth avenue west	1 02
Both sides of the alley in block 70, Myer's Rearrangement, Duluth Proper, Second division	90

MISCELLANEOUS MATTERS.

To avoid the heavy expense of maintaining the planking on Railroad street, authority was obtained from the council to construct a timber crib along the lower side of the street between Seventh and Fifteenth avenues west, to fill in the roadway, and to place the street in a condition of permanent improvement. The work which is about completed, has cost up to date, as follows:

Labor	$ 1,602 37
Timber	606 69
Hardware	401 95
Total	$ 2,611 01

The public dock at the foot of Garfield avenue was reconstructed at a cost of $846.13 and a further improvement made by removing, at a cost of $120, all slabs and other material projecting from the face of the dock for the full width of Garfield avenue and to a depth of 14 feet below the surface of the water.

On May 3, 1896, the contract for furnishing ferry service on the ship canal was discontinued and the work placed under direct charge of the Board of Public Works. The expense of maintaining the service for the year, including the cost of four new row boats and a scow, heating and lighting the waiting rooms, repairing damages occasioned by storms and all incidental outlays, was $3,651.32.

Under authority of the council an independent telephone line was established between the office of the board and the pumping station at Lakewood at a cost of about $500.00. The line has proved almost indispensable and has greatly facilitated business between those points.

The office work for the year was considerably increased by the waterworks construction, and a corresponding addition to the office help was unavoidable.

Respectfully submitted,

R. MURCHISON,

Clerk Board of Public Works.

EXHIBIT "A."

Disbursements on Maintenance and Contracts for the Year Ending, February 28, 1897.

Material acct., District No. 1	$ 269 81
Material acct., District No. 2	1,574 73
Material acct., District No. 3	465 78
Material acct., District No. 4	924 39
Material acct., District No. 5	179 55
Material acct., Sewer District	2,202 82
Removing ice from sewers	467 84
Removing ice from culverts	140 10
Removing ice from sidewalks	5,286 61
Removing ice from streets	2,786 50
Removing ice from catchbasins	324 37
Removing ice from ditches	22 90
Removing ice from gutters	571 05
Removing ice from crosswalks	239 35
Repair tile sidewalks	13 84
Repair culverts	869 10
Repair gravel streets	3,961 02
Repair gutters	877 51
Repair crosswalks	603 52
Repair sewers	840 63
Repair alleys	60 70
Repair macadam streets	1,610 50
Repair paved streets	1,936 77
Repair bridges	1,235 04
Repair catchbasins	397 21
Repair wood sidewalks	3,492 76
Repair docks	203 70
Repair Mission creek	771 96
Repair scales platform	7 48
Repair sweepers	29 98
Repair London Road	1,443 02
Repair fountains	93 15

Repair Grand avenue west	1.599	85
Repair crib St. Croix avenue	129	95
Repair viaduct Sixth avenue west	53[illegible]	49
Repair City Hall, West Duluth	51	94
Repair Fire Hall, New Duluth	6	00
Repair Viaducts	394	54
Repair road grader	3	75
Cleaning gravel streets	1 875	00
Cleaning macadam streets	760	75
Cleaning paved streets	3,558	88
Cleaning sidewalks	311	19
Cleaning crosswalks	134	90
Cleaning alleys	1,061	25
Cleaning sewers	1,502	09
Cleaning catchbasins	576	40
Cleaning gutters	2,018	23
Cleaning culverts	545	95
Cleaning ditches	280	10
Miscellaneous work on streets	4,697	61
Miscellaneous work on sewers	727	72
Flushing sanitary sewers	994	36
Construction ditches	104	70
Construction railroad street	3,246	37
Construction county roads	3,181	96
Construction fountains	429	37
Construction polling booths	234	74
Construction armory	26,783	60
Construction tile and concrete sidewalks	61	09
Construction crosswalks	834	93
Construction wood sidewalks	3,647	59
Lighting city proper	50,440	90
Lighting New Duluth	2,630	10
Lighting Fond du Lac	1,178	10
Lighting Park Point	300	50
City Hall	74	14
Chain gang	1,452	16
Delivery of free water	42	52
Operating ferry across canal	3.651	32
Sprinkling streets	1,848	01
Board of Public Works	17	25
Crusher operations	1,102	15
Cash collections	843	64
Removing jail, New Duluth	56	10
Cistern at Ninety-seventh avenue west	93	43
Removing iron cage, etc., Lakeside	49	50

Maintenance of armory	2.080 59	
Miscellaneous accounts	10,098 41	
Final 5 per cent held on following Contracts:		
Fourteenth Avenue East		$ 290 14
Twenty-sixth Avenue West culvert		26 00
Palm street		369 10
Southwest corner Lake avenue and Superior street		33 68
Sanitary sewer and grading alley, blk 70, 2nd Division		48 37
Sanitary sewer, Fifth alley, Twenty-sixth to Twenty-seventh avenue west		27 60
Helm avenue		94 41
Sanitary sewer, Jefferson street		22 06
Construction Fifth alley		10 02
Sanitary sewer, Seventeenth avenue west		6 78
Construction Seventh alley, Fifth avenue east to Sixth avenue east		20 22
Sprinklers		84 52
Road roller No. 2		75 89
Water rent		560 58
Plus 5 per cent		9 33
Maintenance material		11,962 44
Maintenance pay roll		55,036 54
Temporary improvement		3,930 55
Permanent improvement		43,315 48
Electric Lighting		54,224 10
	$170,147 81	$170,147 81

EXHIBIT "B."

Contracts for Street, Avenue and Alley Improvements.

BRIDGE AND STREET IMPROVEMENTS, 1896.

TABLE NO. 1.

Location	From	To	Cubic Yards Earth Moved.		Cubic Yards Rock.	Feet B. M. Timber.	Lineal Feet Stone Curbing	Square Yards Telford Macadam.	Cubic Yards Gravel Surfacing.	Cubic Yards Masonry.	Square Yards Paving.	Cubic Yards Loam.	Piles	Width Bet. Curbs.	Kind of Paving.	Total Length Under Contract.	Cost of Paving or Gravel Surfacing per square yard.	Cost of Curbing per Lineal foot.	Engineer's Estimate of Cost.	Amount of Work Done in 1896.	Amount Paid in 1896	Amount Due on Work Done.	Estimated Amount to Complete.	Work Commenced	Final Estimate Certified.	Contract Expires.	Final 5 per cent Certified.	Contractors.
			Excavation	Borrow																								
Contracts Carried Over from Previous Year.																												
ourteenth avenue east	South street	Fourth street																			$ 136 71	$ 290 14						Geo. R. King & Co.
w street	Seventeenth avenue west	Eighteenth avenue west																			137 62						June 4, 1896	A. G. Aronson
ange street	Highland avenue	West Line Duluth Heights																			538 25						June 1, 1896.	P. McDonnell.
hird street	Twentieth avenue west	Twenty-eighth avenue west																			462 02						June 1, 1896.	P. McDonnell.
hird street and Grand avenue west	Twenty-eighth avenue west	Thirty-seventh avenue west																			548 22						June 1, 1896	P. McDonnell.
rst alley	Washington avenue	Eighth avenue east																			65 95						June 29, 1896	O'Connell & Grimmer.
venth street	East side of Eighth avenue east																				7 70						March 26, 1896.	F. W. Preston.
alm street	Arlington avenue	West Line of Duluth Heights	1,230		943	9,734			2,412	115				34			$ 0 185			$ 3,493 55	3,762 13	391 30		June 10, 1895	August 26, 1896	December 1, 1895		Green, Burbrick & Co.
ort Line Park road	Gravel pit	Short Line Park	1 689		3				9											286 79	511 55			Sept. 23, 1895	June 29, 1895	November 15, 1895	June 29, 1896	Wm. Cavanaugh
Piedmont avenue west	50 feet south of First street	40 feet north of Third street }	15			22			202											240 85	500 44			October 25, 1895	June 8, 1896	December 15, 1895	November 23, 1896	A. G. Aronson
Third street	Piedmont avenue west	Twentieth avenue west }																										
W. Corner of Lake avenue and Superior street						35				5	61				Cedar Block on sand and concrete		1 50 0 50			113 29	163 64	33 68		October 25, 1895	June 13, 1896	December 15, 1895		S. Larsen.
ley in block 70, Duluth Proper, Second and Division		(Broom Corn Alley)	108		2	2,404			42	83							0 123			611 93	581 34	30 59		November 11, 1895	July 17, 1896	December 15, 1895		S. Larsen
velfth avenue east	Fourth street	Fifth street	17						63											56 58	63 84			November 7, 1895	July 3, 1896	December 15, 1895	July 3, 1896	J. D. O'Connell
leigh street	Sixty-third avenue west	Grand avenue west	128			4 895			556								0 177			540 70	640 70				July 13, 1896	December 15, 1895	December 14, 1896	J. D. O'Connell
fth alley	First avenue east	Second avenue west																			177 41							Johnson & Larson
venty-first avenue west	St. P. & D. R. R. Tracks	Raleigh street																			35 63							P. McDonnell.
		Total	8,187		943	17,091			3,281	203	61									$ 5,403 64	$ 8,322 95	$ 746 71						
Contracts Ordered During 1896.																												
rfield avenue	Dock at southerly end					14,646							92			115			$ 707 06	$ 846 13	$ 846 13			May 5, 1896	June 22, 1896	June 1, 1896	November 6, 1896	John Somerville
lm avenue	Twenty-eighth avenue west	Thirtieth avenue west	2,009			9,934			1,015					36		932	$ 0 177		2,266 00	1,888 27	1,793 86	$ 94 41		August 17, 1896	September 8, 1896	September 1, 1896		Henry Smith
fth alley	Second avenue west	Mesaba avenue	183			944	180		68	2						195	0 146	$ 0 20	182 60	200 47	190 45	10 02		August 6, 1896	September 2, 1896	September 15, 1896		John Schillander
venth alley	Fifth avenue east	Sixth avenue east	250			3,992	401		124	15						400	0 10	0 15	463 32	404 35	384 13	20 22		September 1, 1896	October 26, 1896	October 15, 1896		Tullock Bros.
Pine avenue	Garfield avenue	Arthur avenue }														1,253			12,441 30				$ 11,500 00					Porter Bros.
rthur avenue	Pine avenue	Spruce avenue }																										
thur avenue	Spruce avenue	Duluth-Superior bridge														500			6,721 29				4,217 30					Samuel Meniere
ne thousand-barrel cistern at New Duluth						11,751													250 00	535 44	535 44				November 9, 1896	August 1, 1896	January 4, 1897	A. W. Shaw.
		Total	3,042			41 267	581		1,207	17			92			3,425			$ 23,037 08	$ 3 874 66	$ 3,750 01	$ 124 65	$ 15,747 30					
Street Sprinkling Contracts, 1896.																												
strict No. 1																				$ 703 59	$ 703 59							Karon.
strict No. 2																				641 55	641 55							John Peterson
strict No. 3																				644 42	644 42							Haug.
strict No. 4																				669 94	669 94							Karon
strict No. 5																				339 00	339 00							Samuel Zeboll.
strict No. 6																				356 10	356 10							Kuner.
		Total																		$ 3,354 60	$ 3,354 60							
Street Sweeping Contracts, 1896.																												
strict No. 1																				$ 1,122 58	$ 1,122 58							A. W. Clark
strict No. 2																				798 39	798 39							Andrew Lindgren
		Total																		$ 1,920 97	$ 1,920 97							
	Total for fiscal year		6,229		943	58,358	581		4,191	220	61		92			3,425			$ 23,037 08	$ 14 553 87	$ 17,348 53	$ 870 36	$ 15,747 30					
	Total for previous year		2,198,875	580,820	316,918	13,745,340	251,776	437,102	254,864	74,981	532,210	27,189	48,938			567,130			4,323 735 21	4,063,376 79	4,037,224 86							
	Grand total to March 1st, 1897		2 205,104	580,820	317,861	13,803,698	252,357	437,102	259 055	75,201	532,271	27,189	49 030			570,555			$ 4,346,772 29	$ 4,077,930 66	$ 4,054 573 39	$ 870 36	$ 15,747 30					

EXHIBIT "C."

Contracts for Sewers.

SANITARY SEWER CONTRACTS 1896.

TABLE NO. 2.

Contracts Carried Over from Previous Year

Location	From	To	Length Under Contract.	Length Built During 1896.	Cost per Lineal Foot.	Engineer's Estimate of Cost.	Amount of Work Done in 1896.	Amount Paid in 1896.	Amount Yet Due on Work Done.	Estimated Amount to Complete	Work Commenced	Final Estimate Certified.	Contract Expires.	Five Per Cent Certified.	Contractors
Fifth street	Second avenue west	Fifth avenue west						$ 114 65						August 28, 1896	C. J. Frederickson.
Paleston street	Forty-third avenue east	London road						80 56						June 1, 1896	Lee & Thompson.
First alley	Washington avenue	Eighth avenue east						16 08						June 29, 1896	O'Connell & Grimmer.
Eighth avenue east	Superior street	First alley						6 45							
Fifty-6th alley west	Polk street	St. P & D R. R.						446 08						June 8, 1896	J. C. Meining.
Grand avenue east	Fifty-eighth avenue east	Fifty-seventh avenue east						10 43						July 27, 1896	Mike Fitzgerald
Third street	Sixteenth avenue east	Seventeenth avenue east						37 43						July 20, 1896	Sivert Larson
Fifth alley	Twenty-seventh avenue west	Twenty-sixth avenue west			$ 0 75		$ 13 00	42 22	$ 15 50		January 22, 1896	August 31, 1896	June 1, 1896		Samuel Muniece,
Twenty-seventh avenue west	Fourth alley	Fifth alley		282	0 66		184 80	181 11	12 01		January 22, 1896	August 31, 1896	June 1, 1896		
Twenty-ninth avenue west	Helm avenue	Railroad alley						13 02						August 1, 1896	Andrew Swanson
Railroad alley	Twenty-eighth avenue west	Twenty-ninth avenue west						18 60							
Sixth street	Third avenue east	Fourth ave east		277	0 68		182 08	202 98			January 13, 1896	May 25, 1896	May 1, 1896	November 23, 1896	Mike Fitzgerald.
Alley in block 70	Duluth Proper, Second Division	(Broom Corn alley)					5 76	40 44	17 77			July 17, 1896			Sivert Larson.
		Total		559			385 64	$ 1,214 85	$ 45 37						

Contracts Ordered During 1896.

Location	From	To	Length Under Contract.	Length Built During 1896.	Cost per Lineal Foot.	Engineer's Estimate of Cost.	Amount of Work Done in 1896.	Amount Paid in 1896.	Amount Yet Due on Work Done.	Estimated Amount to Complete	Work Commenced	Final Estimate Certified.	Contract Expires.	Five Per Cent Certified.	Contractors
Jefferson street	Fourteenth avenue east	250 feet west of 14th ave east	322	322	$ 1 37	$ 342 00	441 27	419 21	$ 22 06		August 5, 1896	August 22, 1896	September 15, 1896		J. D. O'Connell
Seventeenth avenue	Superior street	Piedmont avenue west	178	178	0 76	173 30	135 57	128 79	6 78		September 24, 1896	October 5, 1896	November 1, 1896		John Grant.
		Total	500	500		$ 515 30	$ 576 84	$ 548 00	$ 28 84						
		Totals for fiscal year		1,059		$ 515 30	$ 962 48	$ 1,762 85	$ 74 21						
		Totals for previous years		203,932			568,897 36	561,489 78							
		Grand total to March 1st, 1897		204,991			$ 569,859 84	$ 566,252 63							

EXHIBIT "D."

Water Works Contracts.

STORM SEWER CONTRACTS 1896.

Contracts Carried Over from Previous Year.

TABLE No. 3.

Location	From	To	Length Under Contract	Length Built During 1896	Length Unfinished	Cost per Lineal Foot	Engineer's Estimate	Amount of Work Done in 1896	Amount Paid in 1896	Amount yet Due on Work Done	Estimated Amount to Finish.	Work Commenced	Final Estimate Certified	Contract Expires	Five Per Cent Certified	Contractors
[illegible]9th avenue [illegible]	Michigan Street	First Street							$ 265 48						July 20, 1896	John Clyne
		T[illegible]							$ 265 48							

Contracts Ordered During 1896.

	Length Under Contract	Length Built During 1896	Length Unfinished	Cost per Lineal Foot	Engineer's Estimate	Amount of Work Done in 1896	Amount Paid in 1896	Amount yet Due on Work Done
Totals for fiscal year							$ 265.48	
Totals for previous years		80,426				411,880.55	407,158.49	
Grand total to March 1st, 1897		80,426				411,880.55	$ 407,423.97	

EXHIBIT "E."

Contracts for Sidewalks.

DESCRIPTION OF SANITARY SEWERS, 1896.

TABLE NO. 4.

Location.	From	To	EXCAVATION.		PIPE.										BRICK.																										
			Earth.	Rock.	6 in.	8 in	9 in.	10 in.	12 in	15 in.	18 in.	20 in	21 in	24 in.	1 ft 6 in x 2 ft 8 in	1 ft 8 in x 2 ft 6 in	2 ft 2 in x 3 ft 3 in	2 ft 4 in x 3 ft 6 in	1 ft 9 in x 2 ft 8 in	1 ft 10 in x 2 ft 9 in	2 ft 10 in x 3 ft 0 in	2 ft 2 in x 3 ft 4 in	2 ft 6 in x 3 ft 9 in	2 ft 10 in x 4 ft 3 in	3 ft 0 in x 4 ft 6 in	2 ft 3 in	2 ft 5 in	3 ft 6 in	3 ft 9 in	4 ft 0 in	4 ft 7 in	Wood	Manholes.	Flush Tanks.	Inlets	Lampholes	Catch Basins	Masonry	Concrete	Timber	Length Built During 1896	
Fifth alley	Twenty-seventh avenue west	Twenty-sixth avenue west	10																															1								
Twenty-seventh avenue west.	Fourth alley	Fifth alley	76		14	271																											1		7						282	
Sixth street	Third avenue east	Fourth avenue east	119		18			275																									1		9						277	
Jefferson street	Fourteenth avenue east	250 feet west of Fourteenth avenue east	200	34	18	316																											3		9						322	
Seventeenth avenue west	Superior street	Piedmont avenue west	120	1	12	178																											1		6						178	
Total for fiscal year			525	35	62	768		275																									6	1	31						1,059	0 20 miles
Total for previous year			202,096	38,209	12,863	79,118	22,790	29,982	26,301	10,808	7,338	3,589	1,079	1,898	1,396	466	931	1,401	1,875	4,622	632	457	465	467	1,424	460	438	466	466	458	418	300	511	97	7,433	129	30	1,938	58	494,746	201,088	38 08 miles
Grand Total to March 1st, 1897			202,621	38,244	12,925	79,886	22,790	30,257	26,301	10,858	7,303	3,589	1,079	1,898	1,396	465	931	1,401	1,875	4,622	632	457	465	467	1,424	460	438	466	466	458	418	300	517	98	7,464	129	30	1,938	58	494,746	202,147	38 28 miles

EXHIBIT "F."

Miscellaneous Contracts.

DESCRIPTION OF STORM SEWERS 1896.

TABLE NO. 5

Location	From	To	PIPE SEWERS.							CONCRETE SEWERS.								BRICK SEWERS.										MASONRY SEWERS.					CATCH BASINS.						Tunnel.	Manholes.	Pipe.	Masonry.	EXCAVATION		Timber.	Length.	
			10 in.	12 in.	15 in.	18 in.	20 in.	21 in.	24 in	26 in.	28 in.	30 in.	32 in.	34 in.	36 in.	40 in.	44 in.	24 in.	26 in.	28 in.	32 in.	36 in.	39 in.	40 in.	44 in.	45 in.	48 in.	4 ft x 6 ft.	10 ft. x 16 ft	5 ft. x 7 ft.	2½ ft x 5 ft.	2½ ft. x 4 ft.	No. 1.	No. 2.	No. 3.	No. 5.	Special.	Hering and Rosewater.					Earth.	Rock.			
Grand total to March 1st, 1897			134	11.573	9,940	7,957	3,791	6,676	15,354	456	2,751	900	131	157	98	468	472	141	17,415	1 465	1,984	2,878	299	713	1,104	189	708	2,004	510	823	235	707	119	470	40	56	9	13	159	359	192	7,371	1 8 396	13,145	148,771	79,919	15.14 miles.

EXHIBIT "G."

Assessments for Street, Avenue and Alley Improvements.

SIDEWALKS BUILT DURING 1896.

TABLE NO. 6.

Location.	Side.	From	To	TWO FEET.			THREE FEET.			FOUR FEET.			SIX FEET.			EIGHT FEET			TEN FEET.			TWELVE FEET			Price per Lineal Foot.	Total Cost.	Paid to Contractors.	Contractors.
				BUILT BY			BUILT BY			BUILT BY			BUILT BY			BUILT BY			BUILT BY			BUILT BY						
				Owner.	Contractor.	Total.	Owner.	Contractor.	Total.	Owner.	Contractor.	Total.	Owner.	Contractor.	Total.	Owner.	Contractor.	Total.	Owner.	Contractor.	Total.	Owner.	Contractor.	Total.				
Seventh street	North	Third avenue east	Fourth avenue east					404.9	404.9																$ 0.0805	$ 37 43	$ 37 43	J. W. Preston.
Fifty-fourth avenue east	West	Grand avenue east	Oneida street								1,036.0	1,036.0													.139	158 07	158 07	J. W. Preston
Otsego street	North	Fifty-fourth avenue east	Fifty-fifth avenue east								174.4	174.4													.159	27 81	27 81	J. W. Preston
Twelfth avenue east	West	Fourth street	Fifth street											297.6	297.6										.2215	66 07	66 07	J. W. Preston.
Sixth avenue west	East	First street	Second street														308.5	308.5							.28	87 15	87 15	John Boyer.
Vernon street	South	Winnipeg avenue	Grand Forks avenue					303.8	303.8																.082	24 91	24 91	John Boyer
Grand Forks avenue	West	Vernon street	Chestnut street					221.8	221.8																.082	18 19	18 19	John Boyer
Twenty-ninth avenue west	West	Superior street	Third street					975.7	975.7																.0961	93 80	93 80	J. W. Preston.
Greene street	North	Sixty-first avenue west	Sixty-fifth avenue west					1,383.2	1,383.2																.1092	161 28	161 28	J. W. Preston.
Fairmount avenue	North	Woodland avenue	3 blocks westerly								1,127.3	1,127.3													.1196	138 08	138 08	J. W. Preston.
Third street Grand avenue west	North North	Twenty-eighth avenue west East line Centredale addition	West line West Park Division Carlton street											2,314.0	2,341.0										.2188	508 45	598 45	John Boyer.
One hundred thirty-first avenue west	West	Custer street	Gaspe street					591.9	591.9																.109	64 61	64 64	J. W. Preston
Water street	South	Twenty-first avenue east	Twenty-third avenue east					879.9	879.9																.088	78 20	78 20	J. W. Preston.
Twenty-third avenue east	West	Water street	Lake Shore					202.3	202.3																.088	17 80	17 80	J. W. Preston
Ninth street	North	Lake avenue	First avenue west		412.8	412.8																			.064	26 42	26 42	J. W. Preston.
Sixty-fifth avenue west	West	Raleigh street	Main street					411.5	411.5																.094	38 80	38 80	J. W. Preston.
Fifty-second avenue east	East	London Road	Grand avenue east					318.1	318.1																.1018	32 39	32 39	Olson & Markuson.
Nineteenth avenue west	East	Fourth street	Fifth street								327.7	327.7													.164	53 74	53 74	Olson & Markuson
Helm avenue	North	Twenty-seventh avenue west	Twenty-eighth avenue west					419.2	419.2																.0892	37 39	37 39	Olson & Markuson
Nineteenth avenue east	West	Superior street	First street					301.1	301.4																.097	29 22	29 22	Olson & Markuson
Second avenue west	West	Pittsburg avenue	Sixth street								188.1	188.1													.20	38 33	38 33	John Boyer
Palm street	South	Highland avenue	Ebony avenue											880.4	880.4										.2137	188 14	188 14	J. W. Preston.
Palm street	North	Arlington avenue	75 feet west of Ebony avenue											1,685.3	1,685.5										.2137	359 55	359 55	J. W. Preston.
Seventeenth avenue east	West	Superior street	Jefferson street											356.1	356.1										.23	81 53	81 53	John Boyer.
Occidental Boulevard	West	Tioga street	Lot 16, blk 30, Lester Park, Third Div					578.4	578.4																.085	49 16	49 16	John Boyer.
Twenty-second avenue west	East	Sixth street	Seventh street					310.9	310.9																.07	21 87	21 87	John Boyer
Polk street	South	Fifty-ninth avenue west	Sixty-first avenue west		546.8	546.8																			.064	35 00	35 00	J. W. Preston.
Fifty-third avenue east	West	Peabody street	Colorado street					427.5	427.5																.072	30 60	30 60	J. W. Preston.
Peabody street	North	Forty-seventh avenue east	100 ft west of Forty-sixth avenue east					562.5	562.5																.106	66 04	66 04	D. W. Hayden
Crosswalks																										831 93	831 93	J. W. Preston.
Tile and Granolithic Sidewalk Corners																										51 21	48 71	Granoloid Paving Co
			Total		959.6	959.6		8,323.3	8,323.3		2,853.5	2,853.5		5,563.4	5,560.4		308.5	308.5								$ 3,571 30	$ 3,568 88	

Contracts Carried Over From Previous Year.

Location.	Side.	From	To	Two ft. Owner.	Two ft. Contractor.	Two ft. Total.	Three ft. Owner.	Three ft. Contractor.	Three ft. Total.	Four ft. Owner.	Four ft. Contractor.	Four ft. Total.	Six ft. Owner.	Six ft. Contractor.	Six ft. Total.	Eight ft. Owner.	Eight ft. Contractor.	Eight ft. Total.	Ten ft. Owner.	Ten ft. Contractor.	Ten ft. Total.	Twelve ft. Owner.	Twelve ft. Contractor.	Twelve ft. Total.	Price per Lineal Foot.	Total Cost.	Paid to Contractors.	Contractors.
Orange street	Both	Highland avenue	West line Duluth Heights											3,532.0	3,532.0										.2218	$ 826 65	$ 826 65	J. W. Preston.
Fiftieth avenue east	West	Pitt street	Tioga street					1,355.1	1,355.1																.099	135 78	135 78	J. W. Preston
Tile and Granolithic sidewalk corners																											12 30	Robt. S. Wilson & Co.
			Totals		959.6	959.6		9,678.4	9,678.4		2,853.5	2,853.5		9,095.4	9,095.4		308.5	308.5								$ 4,533 73	$ 4,543 61	4.34 Miles.

EXHIBIT "H."

Assessments for Sewers and Outlets.

WATER WORKS CONSTRUCTION.

Contracts Let During 1896.

TABLE No. 7.

LOCATION.	FROM	TO	STEEL PIPE (Lineal feet.)										WATER GATES.								Check Valves.	VALVE BOXES			Air Valves.	Man-holes.	Man-holes with openings for air valves.	Earth in foundation Cubic yards.	Rock in Foundation. Cubic yards.	Mortar rubble masonry. Cubic yards.	Cut stone masonry. Cubic yards.	Feet B. M. Timber.	Thousand Brick	Engineer's Estimate of cost.	Amount of work done 1896	Amount paid in 1896.	Amount yet due on work done	Work commenced.	Final estimate Certified.	Contract Expires.	CONTRACTORS.
			60-inch.	42-inch.									Size.									Size.																			
			3/8 in. Thick	1/2 in. Thick.	15-32 in. Thick.	7-16 in. Thick.	13-32 in. Thick.	3/8 in. Thick.	11-32 in. Thick.	5-16 in. Thick.	9-32 in. Thick.	1/4 in. Thick	42-inch	36-inch.	30-inch.	20-inch.	16-inch.	10-inch.	8-inch.	6-inch.	42-inch.	10-inch	8-inch	6-inch																	
Furnishing intake pipe.			1,402																															$ 18,310 00	$ 17,685 48	$ 16,801 21	$ 884 27		August 3, 1896	April 15, 1896.	The S. Freeman & Sons Mfg Co
Excavation and foundation for pump	house.																											1,917	1,975	1,111	5			9,860 00	9,024 33	8,974 33	50 00	March 6, 1896	December, 19 1896.	October 1, 1896.	McLeod, Campbell & Smith.
Manufacturing and delivering three	miles of 42-inch force main.			1,251	2,800	11,336																				27	4							125,015 00	28,931 70	27,045 62	1,886 08			June 15, 1897	N. F. Hugo.
Superstructure of pump house.																														91	sq ft 2,678	8,000		18,975 00	2,160 70	1,841 70	325 00			July 1, 1897	[illegible] J. Frederickson.
Manufacturing pumping engines,	boilers, etc., and erecting same																																		38,961 38	38,961 38				September 15, 1897.	The D. C. Prescott Co
Manufacturing and delivering three	miles of 42-inch force main					804	3,079	3,032	2,690	848	1,532	5,325														19	4							95,601 50						July 15, 1897	The Carroll-Porter Boiler & Tank Co.
Laying of 60-inch intake pipe in Lake	Superior																																	30,381 50	1,000 00	850 00	150 00			July 1, 1897	King & Steele.
Manufacturing check valves and	valve boxes																				3	36	6	10																March 1, 1897	The D. C. Prescott Co.
Manufacturing and delivering water	gates.												13	4	1	5	3	37	10	12																				July 15, 1897.	Rensselaer M'f'g Co.
Work done by the city.																												3,022	4,331	35		35,000	70		36,966 41	36,966 41					
		Total	1,402	1,251	2,800	12,140	3,079	3,032	2,690	848	1,532	5,325	13	4	1	5	3	37	10	12	3	36	6	10		46	8	4,939	6,306	1,237	2,683	43,000	70	$298,173 00	$131,736 00	$131,440 65	$ 3,295 35				

EXHIBIT "I."

Miscellaneous Assessments.

TABLE NO. 8.

CLASS OF WORK.	PRICE 1889.			PRICE 1890.			PRICE 1891.			PRICE 1892.			PRICE 1893.			PRICE 1894.			PRICE 1895.			PRICE 1896.		
	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.
Earth excavation per cubic yard	$ 0 40	$ 0 20	$ 0 28	$ 0 40	$ 0 10	$ 0 31	$ 0 60	$ 0 22	$ 0 31	$ 0 40	$ 0 10	$ 0 35	$ 0 50	$ 0 20	$ 0 21	$ 0 50	$ 0 10	$ 0 25	$ 1 00	$ 0 12	$ 0 21	$ 0 45	$ 0 15	$ 0 27
Rock excavation per cubic yard	4 50	50	1 60	5 00	50	1 55	2 50	40	1 53	4 00	1 00	1 31	5 25	20	1 87	5 00	10	1 28	8 00	20	1 21			
Borrow per cubic yard	45	01	31	40	35	40	60	20	39	40	25	32	1 80	10	44	40	15	26				05	38	10
Gravel and rolling per cubic yard	1 00	50	78	1 00	70	85	1 27	70	97	1 25	10	1 06	1 50	50	1 00	1 25	40	70	1 00	40	60	1 00	10	77
Loam per cubic yard	65	40	48	65	30	51	1 50	60	81	75	65	70	1 50	50	1 02				75	60	88			
Telford macadam per square yard							1 10	90	1 00	1 10	65	83	1 40	60	92									
Cedar block paving on sand per square yard	1 10	94	1 07	1 25	88	1 07	1 05	93	97	1 11	90	98							1 00	50	88	1 10	75	88
Cedar block paving on concrete per square yard							1 80	1 80	1 80	1 47	1 47	1 47				1 85	1 18	1 37	1 75	1 50	1 58			
Rough stone paving for gutters per square yard	1 28	60	83	1 10	75	93	1 23	75	96	1 20	70	93	1 50	60	92	1 26	50	72	1 00	35	68	1 00	60	74
Rough stone paving in Portland cement per square yard	1 00	1 25	1 43	2 25	1 20	1 89	2 50	1 25	1 06				20 00	1 10	6 85	6 50	1 00	5 41						
H. M. pine timber per M. in place	20 00	15 00	17 46	20 00	15 00	17 00	25 00	15 60	19 52	22 00	10 00	10 40	25 00	16 00	19 22	20 00	12 00	16 31	30 00	12 50	17 97	25 00	13 50	16 41
H. M. oak timber per M. in place							45 00	31 00	38 00	40 00	40 00	40 00	50 00	30 00	41 75				50 00	50 00	50 00	40 00	30 00	35 00
Piles in place per lineal foot and each	41	41	41				18	16½	17¼	18	18	18	7 50	3 25	4 02	4 50	2 00	3 28	4 00	1 50	3 21	18	10	12
Granite curb per lineal foot			1 40	1 25	1 00	1 10	1 47	88½	1 11	1 32	94	1 00	2 00	90	1 51	1 50	90	1 20				1 05	75	87
Rough stone curb per lineal foot													40	16	31	27	15	20	40	15	22	25	15	20
Sandstone curb per lineal foot	93	83	88	85	61	73	1 00	60	81													80	60	68
Parkhurst curb and gutter per lineal foot													1 50	1 00	1 29	1 50	1 12	1 23						
Tar per gallon							13	10	12	11	12	13												
Removing and relaying sidewalks per lineal foot	10	05	07½	10	04	07	20	02	13	20	09	13				10	05	07				12	05	07
Cast iron per pound	04	03	03½	05	03	04	25	03	07	04	04	04	05	02½	04	05	02	03½						
Earth excavation in foundation per cubic yard	80	35	40	70	35	57	1 00	15	58	1 00	20	61	80	20	59	1 10	15	41	1 00	15	40	70	20	42
Rock excavation in foundation per cubic yard	4 50	60	2 61	5 00	1 50	3 89	7 50	50	4 13	12 50	01	3 81	15 00	05	4 82	9 00	1 00	3 83	8 50	30	3 03	6 00	75	3 47
Twenty-four inch pipe in concrete per lineal foot	2 50	2 00	2 30	2 50	1 27	2 10	3 00	3 00	3 00				2 90	1 50	2 16	2 35	1 00	2 01	2 25	1 85	2 01			
Twenty-four inch pipe in sand per lineal foot													3 00	1 30	1 71									
Twenty-one inch pipe in concrete per lineal foot	2 30	2 00	2 18	2 00	1 60	1 66	4 00	4 00	4 00	2 00	2 00	2 00				2 00	1 30	1 72	2 00	1 10	1 77			
Twenty inch pipe in concrete per lineal foot	1 95	1 60	1 82	2 50	1 10	1 91	2 00	2 00	2 00	2 00	1 85	1 93												
Eighteen inch pipe in concrete per lineal foot	1 90	1 30	1 57	2 00	85	1 60	2 25	1 60	1 85	1 75	1 37	1 58				1 75	1 05	1 36	1 45	1 10	1 26			
Fifteen inch pipe in concrete per lineal foot													2 00	1 27	1 60									
Fifteen inch pipe in sand per lineal foot	75	55	63	85	30	60	90	55	60	1 10	50	71	80	13	61	70	40	55						
Twelve inch pipe in sand per lineal foot	75	50	58	65	20	45	75	40	53	60	30	46	70	30	50	60	30	41	65	30	43	50	30	43
Ten inch pipe in sand per lineal foot	60	40	44	36	20	30	75	42	53	50	25	39	60	30	42	47	28	35	45	30	32			
Nine inch pipe in sand per lineal foot	62	30	38	40	16	28	45	29	37	35	25	31	45	26	35									
[illegible] pipe in sand per lineal foot	40	25	29	70	15	25	40	26	34	45	32	37	70	20	32	40	20	28	30	17	21	30	20	24
Six inch pipe in sand per lineal foot	25	10	18	22	14	18	30	18	21	30	18	21	40	11	25	30	11	21	40	15	21	27	19	22
Sewer brick per M. laid	20 00	17 00	17 75	18 00	15 00	17 00	25 00	17 00	20 27	30 00	20 00	23 10	30 00	16 00	19 89	20 00	13 00	16 66						
Cut stone masonry per cubic yard	25 00	15 00	21 73	25 00	13 00	20 00	25 00	18 00	22 73	25 00	15 00	20 00												
Second-class masonry per cubic yard													25 00	3 00	12 00	25 00	7 50	14 87	25 00	15 00	19 03			
Mortar rubble masonry per cubic yard	4 50	80	3 08	5 00	3 50	4 10	7 50	4 00	4 87	6 00	4 00	4 57	7 00	2 50	4 88	6 00	2 75	3 94	4 75	2 35	3 18			
Portland cement masonry per cubic yard							6 00	4 75	5 25	7 50	6 00	6 62												
Pene hammered work per square yard	40	25	33	1 00	30	52	35	20	28															
No. 1 intakes, each	53 00	40 00	48 00	60 00	30 00	44 00	60 00	30 00	47 12	50 00	30 00	41 25	60 00	35 00	47 08	60 00	20 00	41 50						
No. 2 intakes, each	60 00	35 00	39 20	40 00	30 00	36 75	60 00	20 00	41 86	50 00	35 00	42 10	55 00	30 00	41 50	60 00	15 00	36 67						
No. 3 intakes, each							50 00	40 00	43 33	50 00	40 00	46 60												
No. 5 intakes, each	50 00	40 00	38 33				70 00	60 00	65 00				80 00	30 00	45 42	65 00	20 00	42 05						
No. 6 intakes, each													50 00	5 00	37 11	15 00	16 00	10 50						
No. 3 catch basins, each							60 00	40 00	50 00	80 00	60 00	70 00	70 00	20 00	50 67	60 00	35 00	47 17						
No. 7 catch basins, each																70 00	10 00	49 31	75 00	35 00	51 61			
Manholes (sewer), each	65 00	35 00	51 73	75 00	25 00	48 60	75 00	40 00	51 00	60 00	40 00	55 50	100 00	30 00	53 60	65 00	30 00	46 17	70 00	25 00	43 12	50 00	40 00	43 90
Flush tanks, each													175 00	35 00	91 21	100 00	40 00	67 44	100 00	25 00	62 27			
Lamp holes, each			18 00	20 00	8 00	14 00	30 00	10 00	20 00	2 00	1 00	1 48												
Inlets, ⅛ bends, each	3 00	90	1 40	2 00	25	1 10	3 00	30	1 48															
Concrete, Portland, per cubic yard										10 00	10 00	10 00							15 00	9 50	12 17			
Concrete, American, per cubic yard										7 00	7 00	7 00							10 00	7 00	8 33			
Twenty-six inch storm sewer per lineal foot													3 25	1 60	2 43									
Twenty-four inch storm sewer per lineal foot																2 25	1 25	1 74						
Twenty-eight inch concrete sewer per lineal foot																3 30	1 30	2 85						
Two feet, five inch brick sewer per lineal foot																2 50	1 45	1 93	2 50	1 60	1 98			
Two feet, three inch brick sewer per lineal foot																2 35	1 35	1 92	2 05	1 50	1 80			
Rip-rap per cubic yard													1 00	1 00	1 12									
Tile sidewalk on Portland cement concrete per square foot																30	19	21½	30	19	24			
Granolithic sidewalk per square foot																36	22	29	30	22	25			
Sixty inch steel pipe per lineal foot																			18 67	9 11	13 61			
Flexible steel joints for 60-inch pipe																			920 00	300 00	569 50			
Right steel joints for 60-inch pipe																			200 00	60 00	117 50			
Steel reducer pipe 60 to 78 inches diameter																			1,385 00	600 00	1,035 00			
Steel pipe for wall connection																			250 00	175 00	216 50			
Earth dredging per cubic yard																			1 00	50	67			
Rock dredging per cubic yard																			22 50	6 00	11 84			
Sixty inch double gate valve																			1,600 00	500 00	866 67			
Laying [illegible] pipe per lineal foot																			18 00	4 00	7 19			
Forty-two inch steel pipe, class "A," per lineal foot																						10 30	9 00	9 54
Forty-two inch steel pipe, class B, per lineal foot																						9 50	8 42	8 92
Forty-two inch steel pipe, class C, per lineal foot																						8 75	6 30	7 30
Forty-two inch steel pipe, class D, per lineal foot																						7 15	5 95	6 49
Forty-two inch steel pipe, class E, per lineal foot																						6 70	5 70	6 19
Forty-two inch steel pipe, class F, per lineal foot																						6 31	5 45	5 90
Forty-two inch steel pipe, class G, per lineal foot																						5 95	5 25	5 58
Forty-two inch steel pipe, class H, per lineal foot																						5 50	5 05	5 24
Forty-two inch steel pipe, class I, per lineal foot																						5 10	4 80	4 95
Manholes and covers																						45 00	15 00	34 38
Four inch openings for air valves																						45 00	3 50	11 70
Ten inch branches																						20 00	9 00	15 62
Eight inch branches																						20 00	5 00	13 87
Six inch branches																						20 00	5 00	13 12
Forty-two inch cast iron pipe, class E, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class F, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class G, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class H, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class I, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class J, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class K, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class L, per lineal foot																						8 00	7 51	7 75
Forty-two inch cast iron pipe, class M, per lineal foot																						8 00	7 51	7 75
Manholes and covers																						75 00	6 50	70 00
Four inch openings for air valves																						75 00	10 00	12 50
Ten inch branches																						75 00	17 00	40 00
Eight inch branches																						75 00	17 00	46 00
Six inch branches																						75 00	15 00	45 00

EXHIBIT "J."

Lakeside Assessments.

TABLE OF CEMENT TESTS.

TABLE NO. 9.

BRAND.	NEAT CEMENT.																			
	IMMERSED.												NOT IMMERSED.							
	24 Hours.		7 Days.		1 Month		3 Months.		6 Months.		1 Year.		1 Month.		3 Months.		6 Months.		1 Year.	
	No. of Briquettes	Average	No. of Briquettes	Average.	No. of Briquettes	Average	No. of Briquettes.	Average	No. of Briquettes.	Average.	No. of Briquettes.	Average	No. of Briquettes.	Average	No. of Briquettes.	Average.	No. of Briquettes	Average.	No. of Briquettes.	Average.
Milwaukee	25	114	25	139	20	160	30	272	20	313	5	338			5	311	5	305	5	329
Mankato	5	121	5	161	5	221	5	282	5	243	5	294								
Louisville	20	107	15	169	20	212	10	288	15	301	5	357								
Akron (Red Star)	5	131	5	231	5	320	5	348	5	389										
Buffalo (Natural).	10	138	10	233	10	303	5	371	10	368	5	331								
Sandusky (Portland).	5	95	5	320		437	5	490	5	536										
Glens Falls (Portland)	5	306	5	571		511														
Empire (Portland)	5	331	5	419			10	577	10	603	5	586								
Atlas (Portland)	5	391	5	485	5	610	5	583												
Kaiser (Portland)	5	149			5	510														
Hemmoor (Portland)	5	250	5	391	5	462	5	521												
Aalborg (Portland)									5	606	5	513			5	267	5	192	5	278
Alpha (Portland)									5	614	5	600			5	269	5	236	5	323
Stettin-Gristower (Portland)																				
Lagerdorfer (Portland)	5	323	5	115		589			5	672	5	610								
Germania (Portland)											5	594								
Alsen (Portland)	5	331	5	467	5	485	5	538												
Totals	105		95		95		85		85		45				15		15		15	

BRAND.	CEMENT AND SAND.																							
	FINE LAKE SAND.								COARSE LAKE SAND.								COARSE BANK SAND, UNWASHED.							
	1 CEMENT, 2 SAND								1 CEMENT, 2 SAND.								1 CEMENT, 2 SAND.							
	1 Month.		3 Months.		6 Months.		1 Year.		1 Month.		3 Months		6 Months.		1 Year.		1 Month.		3 Months.		6 Months.		1 Year	
	No. of Briquettes	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average	No. of Briquettes.	Average.	No. of Briquettes	Average	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes	Average
Milwaukee					5	119	5	155					10	147	10	113	15	134	15	151	20	169	10	183
Mankato							5	93					5	95	5	99					5	122	5	127
Louisville									10	79	10	128	10	153	5	169								
Akron (Red Star)									5	102	5	148	5	149										
Buffalo (Natural).									5	96	5	126	10	134	5	113								
Sandusky (Portland).																								
Glens Falls (Portland)																								
Empire (Portland)																								
Atlas (Portland)																								
Kaiser (Portland)																								
Hemmoor (Portland)																								
Aalborg (Portland)																								
Alpha (Portland)																								
Stettin-Gristower (Portland)																								
Lagerdorfer (Portland)																								
Germania (Portland)																								
Alsen (Portland)																								
Totals					5		10		20		20		40		25		15		15		25		15	

BRAND.	CEMENT AND SAND.																							
	COARSE BANK SAND, WASHED.								GROUND QUARTZ.								COARSE LAKE SAND. Not Immersed.							
	1 CEMENT, 2 SAND.								1 CEMENT, 2 SAND.								1 CEMENT, 2 SAND.							
	1 Month.		3 Months.		6 Months.		1 Year.		1 Month.		3 Months.		6 Months.		1 Year.		1 Month		3 Months.		6 Months.		1 Year.	
	No. of Briquettes	Average	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average	No. of Briquettes.	Average.	No. of Briquettes	Average	No. of Briquettes.	Average	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average	No. of Briquettes.	Average.
Milwaukee					5	182	5	183	5	81	10	141	10	170	5	105					5	126	5	171
Mankato			5	137	5	138																		
Louisville																								
Akron (Red Star)																								
Buffalo (Natural).																								
Sandusky (Portland).									5	388	5	350	5	481										
Glens Falls (Portland)									5	439														
Empire (Portland)									5	339	5	461	5	433	5	402								
Atlas (Portland)									5	333	5	465												
Kaiser (Portland)																								
Hemmoor (Portland)																								
Aalborg (Portland)													5	452	5	167								
Alpha (Portland)													5	523	5	197								
Stettin-Gristower (Portland)													5	419	5	427								
Lagerdorfer (Portland)													5	395	5	394								
Germania (Portland)																								
Alsen (Portland)									5	302														
Totals			5		10		5		30		25		40		30						5		5	

BRAND.	COARSE BANK SAND.										Total Number of Briquettes.
	CEMENT 1 LB., SAND 1 LB.										
	7 Days.		1 Month.		3 Months.		6 Months.		1 Year.		
	No. of Briquettes.	Average.	No. of Briquettes	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	No. of Briquettes.	Average.	
Milwaukee							10	256	10	267	300
Mankato											65
Louisville											120
Akron (Red Star)											40
Buffalo (Natural).											75
Sandusky (Portland).											40
Glens Falls (Portland)											20
Empire (Portland)											55
Atlas (Portland)											30
Kaiser (Portland)											10
Hemmoor (Portland)											20
Aalborg (Portland)											35
Alpha (Portland)											35
Stettin-Gristower (Portland)											10
Lagerdorfer (Portland)											35
Germania (Portland)											5
Alsen (Portland)											25
Totals							10		10		920

Total Number of Briquettes Made 1,080.

ANNUAL REPORT

—OF THE—

CITY ENGINEER,

—TO THE—

BOARD OF PUBLIC WORKS,

—FOR THE—

FISCAL YEAR ENDING FEBRUARY 28, 1897.

Report of the City Engineer.

OFFICE OF THE CITY ENGINEER,
DULUTH, MINN., March 1, 1897.

TO THE HONORABLE BOARD OF PUBLIC WORKS OF THE CITY OF DULUTH:

GENTLEMEN:

I have the honor to submit the following report of the work of the Engineering Department for the fiscal year ending February 28, 1897.

The organization of the Department is as follows:

Name.	Rank.	Salary Per Annum.	Entered Employ of City.
W. B. Patton	City Engineer	$ 2,400 00	May, 1895.
E. J. Duffies	Principal Assistant	1,500 00	June, 1891.
E. W. Lewis	Assistant Engineer	1,200 00	August, 1890.
C. H. Drew	Draughtsman	1,200 00	October, 1887.
L. Ayers	Cement Tester, Inspector of Private Drains, Etc.	780 00	May, 1886.
E. Mooers	Bookkeeper	900 00	June, 1895.
Geo. Ebmer	Transitman	780 00	June, 1888.
Jas. Lawson	Chief of Party and Inspector	780 00	July, 1889.
*J. S. Reeves	Inspector	780 00	July, 1887.
O. H. Mitchell	Chainman	660 00	October, 1895.

*On leave of absence since December, 1896, on account of ill-health.

The cost of the Department for the fiscal year was $13,679.81, the money being expended for the purposes set forth in the following statement which also shows the cost of the same classes of work for the proceeding year:

	Fiscal Year Ending Feb. 29, 1896.	Fiscal Year Ending Feb. 28. 1897.
General office	$ 2,618 20	$ 2,011 74
Preliminary surveys	361 30	
Permanent surveys	60 99	55 84
Estimate new work	1,418 34	269 39
Condemnations	136 59	130 36
New divisions	30 62	10 25
Engineering contracts	3,554 20	1,397 47
Inspecting contracts	3,684 49	1,579 93
Waterworks	2.334 44	5,339 47
Maintenance	685 38	1,343 28
Legal	166 87	67 58
Inspecting private drains	66 85	31 31
Testing cement	117 74	40 46
Park Commission	69 50	
Board of Education	23 50	2 32
Special committee investigating Duluth Gas & Water Co	175 32	
Miscellaneous street work	3 20	
City Clerk	2 66	
Inspecting waterworks		1,400 41
Total	$ 15,540 19	$ 13.679 81

The total amount expended on construction work, let under the supervision and direction of this department in 1896, was $144,483.10, being an increase of about 208 per cent over the previous year. The cost of the Department for this year was $13,679 81, a decrease of 12 per cent compared with last year.

Besides the amount expended on contracts let during the year 1896, the sum of $10,778 was expended on contracts let the previous year, but which were not completed until the following year.

TABLES OF WORK DONE.

The tables which accompany this report show in detail many interesting facts regarding work done under the plans and supervision of the Department during the past year and in comparison with previous years. The following is a list of the tables with a statement of the contents of each:

Table No. 1, Bridge and Street Improvements 1896.
a. Contracts carried over from previous year.
b. Contracts ordered during 1896.

c. Street sprinkling contracts during 1896.
d. Street sweeping contracts during 1896.

Table No. 2, Sanitary Sewer contracts during 1896.
a. Contracts carried over from previous year.
b. Contracts ordered during 1896.

Table No. 3, Storm Sewer Contracts for 1896.
a. Contracts carried over from previous year.

Table No. 4, Description of Sanitary Sewers 1896.

Table No. 5, Description of Storm Sewers 1896.

Table No. 6, Sidewalks built during 1896.

Table No. 7, Cost of different classes of work 1889-1896, inclusive.

Table No. 8, Cement Tests.

Table No. 9, List of Monuments.

Table No. 10, Total number of miles of Sewer and Street Improvements from 1886 to present time.

Table No. 11, Waterworks construction. Contracts let during 1896.

I would also direct your attention to the report of Mr. E. J. Duffies, Principal Assistant Engineer, which accompanies this report and contains much valuable and interesting matter.

STREET IMPROVEMENTS.

During the year seven contracts for street and bridge improvements have been let at an aggregate estimated cost of $23,037.08. Five were completed during the year; one, the approach to the Duluth-Superior bridge being under construction, and the other, the paving of Pine and Arthur avenues, not having been started, on account of the early advent of cold weather preventing the work of grading from being prosecuted.

In addition to the amount expended on street improvements ordered during the year 1896, the sum of $8,322.95 was expended on contracts carried over from the previous year. Under this head, although not a part of the city work, I desire to call attention to the bridge now under construction by the Duluth-Superior Bridge Company, between

Rice's Point, Duluth and Connor's Point, Superior, Wisconsin. Although this is a private enterprise, it is also, to a great extent, a public work and will render communication between the cities at the "Head of the Lakes," convenient and rapid and will result in increased interurban travel and business. The bridge, as planned, and now being erected, is an engineering undertaking of considerable magnitude, consisting of a draw span and two fixed spans. The length of the draw span is 490 feet giving a clear channel on each side of 200 feet. Height of bottom of draw span above water 20 feet; length of fixed spans 301 feet and 9 inches; total weight of structure about 3,600 tons.

SANITARY SEWERS.

But little work has been done in the construction of sanitary sewers, but two contracts of an aggregate cost of $576.84 were let during the year. Estimates were made on work started the year previous to the amount of $1,214.85, making the total expenditure for this class of work $1,791.69. The total amount paid for the construction of sanitary sewers from the first one built in 1886 to date is $566,252.63, the total length being 38.28 miles.

STORM SEWERS.

The city is now provided with 15.14 miles of storm sewers which have been built at a total cost of $407,423.97.

No storm sewers have been built during the past year the only estimate prepared on this class of work was for the payment of a five per cent maintenance guarantee on the Twenty-sixth avenue west storm sewer, amounting to $265.48.

SIDEWALKS.

Twenty-five sidewalk contracts amounting to $2,685.16 were let during the year and the work was entirely completed. Besides this, work to the value of $974.73 was done on contracts carried over from the previous year, and $834.93 was expended on the cross walk contract and $48.79 for granolithic sidewalk corners, making the total amount of work done on sidewalk construction $4,543.61.

WATERWORKS CONSTRUCTION.

But little actual work of construction has been accomplished on the waterworks owing to the fact of the uncertainty attending the sale of the water and light bonds, but everything possible has been done to arrange matters so that rapid progress can be made the coming year.

The contract for furnishing the 60-inch riveted steel intake pipe, which was let to the S. Freeman & Sons Mfg. Co., of Racine, Wis., was completed, and the pipe and specials fully delivered on the ground by July 24th, 1896. The workmanship on the pipe is excellent and on applying the specified test pressure it was found to be tight and satisfactory.

The estimated cost of this work was $18,340.00 and the actual cost, $17,685.48.

After several ineffectual attempts to let a contract at a satisfactory price, for the work of laying the intake pipe and performing the work incident thereto, the work was undertaken by the city by day work under the supervision of your Honorable Body. The well was excavated and lined, the intake valve furnished and set, and the well connection length, and first flexible joint of the intake pipe, put in place, and a tunnel driven under the lake bottom for the distance of 268 feet from the center of the well, when the day work was discontinued, the total expenditure being $14,377.64.

A contract was afterward let to King & Steele for completing the work in accordance with the plans and specifications for the sum of $32,000.00, the estimated cost of the items included in this contract being $25,350.00. Work under this contract has been pushed as rapidly as the conditions of the weather would permit, the sub-marine blasting has been practically completed and the rock dredged out of the trench for a considerable distance, and there should be no difficulty in completing the entire work at the specified time, to-wit; July 1, 1897.

A contract, for the excavation of the foundation, and the constructing of the foundation walls of the pump house was let to McLeod, Campbell & Smith on February 17, 1896, and the work was completed.

The contract was finished in a very satisfactory manner, the total cost was $9,024.33 and the estimated cost, $9,860.00.

On October 13th, 1896, a contract was entered into with C. J. Frederickson for the construction of the entire superstructure of the pump and boiler house on his proposal for a rock faced ashlar wall of sandstone at the price of $18,318.00, the estimated cost for brick being $18,975.00. An effort was made to continue the construction of the walls through the winter, but the changeable weather conditions were very unfavorable, and owing to the alternate freezing and thawing of the mortar a great part of the work so constructed will have to be torn down and rebuilt.

On September 23rd, 1896, a contract was entered into with N. F. Hugo for the construction and laying of the first three miles of the force main of 42-inch riveted steel pipe extending from the pump house at Lakewood to Lester river. This contract was let by the City Council without advertisement, at a price of $503.75 below the lowest bids received at the public letting a few weeks previous, all of the bids received at that time being rejected. The contract price, based on the estimated length at each class of pipe is $120,202.12, the estimated cost being $125,015.

The letting of this contract insured the establishment of a steel pipe manufactory in the city and the employment of a large amount of local labor. The contractor installed his machinery and began the construction of the pipe in a very short time, considering that nothing had been done at the time of letting the contract. The quality of work, turned out, has been excellent and would be creditable to any shop. The total value of the work done under this contract at the close of the fiscal year, including steel plate on hand, amounted to $27,045.62.

On October 30th, 1896, bids were opened for furnishing and laying the remaining three miles of the force main from Lester River to the low level reservoir, and the contract was awarded to the Carroll-Porter Boiler and Tank Co., of Pittsburg, Pa., the contract price based on the estimated length of pipe is $93,656.05, the estimated cost being $95,601.00.

The contract called for the delivery of the pipe to begin on January 1st, 1897, but owing to conditions beyond the control of the contractors. they were unable to comply with this requirement and received a sixty days extension of time.

Both the mill and shop inspection on this contract are being done by the Pittsburg Testing Labratory, Ltd., the mill inspection is at the cost of the contractor and the shop inspection is paid for by the city.

On October 23rd, 1896, bids were opened for furnishing gate valves, check valves, air valves and valve boxes. All bids, except for check valves and valve boxes, were rejected and a re-advertisement ordered by the Common Council. The check valves and the valve boxes were awarded to the D. Clint Prescott Co., of this city at its bid of $1,982. The work is progressing favorably, but no part of the contract has been completed as yet.

As a result of re-advertising for bids for furnishing gate valves, a contract was entered into on February 20th, 1897, with the Rensselaer Manufacturing Company of Troy, N. Y., for furnishing thirteen, 42-inch; four, 36-inch; one, 30-inch; five, 20-inch; three, 16-inch; thirty-seven, 10-inch; ten, 8-inch and twelve 6-inch valves at a lump sum of $13,950.

The contract for the pumping machinery, traveling crane, electric light plant, etc., was awarded by the Common Council to the D. Clint Prescott Co., on its proposal of $92,500 for the work complete, the estimated cost of this work being $90,000.

The work of excavating the trenches, by day work, in such places as the rock was near the surface was carried on under the supervision of your Honorable Body, The earth and rock were excavated and placed on the side of the trench; no backfilling was done, nor was the excavated rock hauled away. On the line of the 42-inch main, 2,556 cubic yards of earth was excavated at the cost of 91 8-10 cents per cubic yard and 3,882.1 cubic yards of rock at the cost of $3.61 per cubic yard. On the line of the 36-inch supply main, 177 cubic yards of earth was excavated at the cost of $1.64 per cubic yard and 139 cubic yards of rock at the cost of $3.06 per cubic yard. The total expenditures being $17,083.83.

The total cost of the work done on the waterworks, east of the low level reservoir, to the close of the fiscal year, including the full contract price of all contracts let, with a statement of the original estimates for the same submitted with the plans for the system, and published in the Ninth Annual Report of your Honorable Body, page 72, is shown in the following table:

Comparison of Estimated and Actual Cost of Waterworks Construction to Feb. 28, 1897.

	First estimate of cost submitted with plans as published in 9th annual report of the Board of Public Works.		Actual cost, days work and contract.
Furnishing intake pipe	$ 19,000 00	Let by contract	$ 17,685 48
Laying intake pipe	35,000 00	Let by contract	32,000 00
		Days work	13,774 00
Pump and boiler house complete	25,000 00	Let by contract	9,024 00
			18,318 00
Pumps, boilers and other machinery	90,000 00	Let by contract	92,500 00
Force main	300,000 00	Let by contract	120 202 12
		" " "	93,656 00
		" " "	11,950 00
		Let by contract	1,982 00
		Day work	16,365 00
		Estimated cost to finish	58,928 00
Incidentals, engineering and inspect'n	46,900 00	Day work, incidentals	5,993 77
		Engineering and inspection	9,074 22
Total	$515,900 00		$501,453 02

The item of $58,928, in the cost of the force main, stated as estimated cost to finish, includes all the work which has not yet been started; such as earth and rock excavation in trenches-construction of manhole wells, culverts, blow offs, etc., and also one dollar per cubic yard for all rock work heretofore excavated by the city and 15 cents per cubic yard for all earth excavated by the city, to complete the work in all particulars; such as backfilling, wasting rock, etc., and allows $4.00 per cubic yard for about 5,000 cubic yards of rock and 40 cents per cubic yard, for about 57,000 cubic yards of earth, not yet excavated; which prices are considerably in excess of the prices for which the work can be done by contract.

An examination of this table will show that the cost of the work to date, including the item of $58,928, for finishing the work is between $14,000 and $15,000 less than the estimated cost, which amount will be available for incidentals, engineering and inspection charges.

I also submit the following table, showing the estimated cost as per detailed estimates submitted to your Honorable Body and the contract price on all contracts, for which detailed estimates were prepared, by which it will be seen that the difference between the estimated cost and the contract price is less than one-tenth of one per cent.

Comparison of Detailed Estimates of Cost and Contract Price on Contracts Let.

	Estimated Cost.	Contract Cost.
S. Freeman & Sons for furnishing intake pipe	$ 18,340 00	$ 17,685 48
McLeod, Campbell & Smith, for pump house foundations	9,860 00	9,024 00
King & Steele, for laying intake pipe	25,350 00	32,000 00
N. F. Hugo, for constructing three miles force main	125,015 00	120,202 12
Carroll-Porter Boiler & Tank Co., constructing three miles steel force main	95,601 00	93,656 00
C. J. Frederickson for constructing superstructure of pump house	18,975 00	18,318 00
D. C. Prescott Co., furnishing pumps, boilers and other machinery	90,000 00	92,500 00
D. C. Prescott Co., for furnishing check valves	2,550 00	1,982 00
Total	$385,691 00	$385,367 95

EXPERT EXAMINATION OF PLANS.

In accordance with a communication from Your Honorable Body, recommending the employment of an expert hydraulic engineer to make an examination of, and report on the plans prepared for the Municipal Water Works, the council committee on Water Works was, on October 13th, 1897, empowered to employ an expert engineer for this purpose and secured the services of L. W. Rundlett, M. A. S. C. E., City Engineer of St. Paul, Minn. Mr. Rundlett made a very careful and painstaking investigation of the whole subject and on Nov. 16th, 1896, presented the following report:

Report of Consulting Engineer L. W. Rundlett, M. A. S. C. E., on the plans, details and specifications of the proposed municipal waterworks system:

DULUTH, MINN., Nov. 16th, 1896.

To the Committee on Waterworks of the Common Council, City of Duluth:

GENTLEMEN:—

In accordance with your request I have examined the plans, details and specifications of the proposed system of waterworks as per resolution of the Common Council approved Oct. 13, 1893, and herewith submit the following report:

The location and topography of the City of Duluth render the problem of a water supply a somewhat difficult and expensive one. The city has a frontage along the lake shore, bay and St. Louis river of about 25½ miles with a varying width back from the lake averaging about 2.7 miles, giving a total area of 67½ square miles. The ground rises in terraces back from the shore of the lake to an elevation of 800 feet above the lake level. The business or central district is already supplied with a system of waterworks through a franchise granted to a private corporation and the city now has under consideration the question of the purchase of this franchise and the works constructed by the company holding said franchise.

In considering the question of the water supply of Duluth, there is one very important unknown factor which must be taken into consideration, namely, the future growth of the city. With the practical experience of past years of rapid and almost unprecedented advance in business prosperity it would be foolish indeed to plan for today, works which might be found inadequate almost before they were finished. The cost of excavation which forms an important factor in the item of expenditure makes it very desirable that the pipe for the main supply should be of ample size for future demands, so that future extensions may be made as required without duplicating the work already done.

In the plans submitted by your City Engineer the new city water supply is divided into three systems, each system supplying a different level. The pumps at the lake deliver all the water into the reservoir of the first or low level system, the surface of the water in the reservoir being 290 feet above the level of the lake. From this system the water, needed for the middle and high service levels, is pumped into the second level reservoir, to an elevation of 565 feet above the lake, and from this system the water is again elevated to the high service at elevations from 795 to 880 feet above the lake in accordance with the requirements of the various districts of this system. The necessity of elevating the water to so great a height makes the operating expenses high, and the cost of raising the water to this high service where the consumption is small will be many times greater than on the low level service.

The low level embraces by far the greater portion of the city including the entire business district, and containing probably nine-tenths of the present population, and as the city increases in population and development this district will always hold this relative position of importance in the particulars above mentioned and consequently requires the most ample provisions.

In order to obtain a supply of water which will be absolutely free from future contamination the main pumping station has been located on the lake shore at the eastern extremity of the city and about eight miles from the center of the business district, and the work of building the intake and constructing a pump house of sufficient size to contain a pumping plant of 30,000,000 daily capacity has already been commenced, and contracts have been let for two 5,000,000 gallon pumping engines, and for a 42-inch steel force main connecting the pumping engine with the proposed reservoir site. It is further contemplated to lay a 36-inch main from the reservoir to a connection with the present system or should the city fail to purchase this system to such other system as the city may construct in the future. All these provisions for a future growth seem to be provided for in a most liberal manner.

Beyond this point such additions can be made from time to time as may be required and the supply may be extended even to the western extremity of the city without seriously affecting the pressure required for fire purposes in the business district.

Reservoir.

The site selected for the reservoir is about six miles west from the pumping station and seems to afford ample space for the present wants and plenty of adjacent ground can be secured for future needs when it shall become necessary to increase the reservoir capacity. The present average water consumption of the city is, I understand, about four million gallons per day. This would indicate an occasional maximum consumption of nearly double that amount. In order to give a sufficient reserve supply to provide for any accident to the machinery, force main or intake pipe whereby it might be necessary to shut down the pumps, it would seem that a reservoir of a capacity to contain several days supply ought to be constructed at once to provide for the present needs. The plans submitted for the low service reservoir of a capacity of 13,500,000 gallons and as far as I have knowledge of the material in that locality appear to be properly planned and amply provided with all piping, valves, etc., necessary for the maintenance and operation of the works. In regard to the construction I have made a few suggestions of minor importance to your Engineer which are hardly necessary to embody in this report. A site contiguous to the reservoir of the water company has been suggested in a report of Mr. Keating, a former city engineer, but it does not seem to me to be of sufficient size for present needs, to say nothing of future extensions, and should the present waterworks be purchased by the city the old reservoir can be utilized to the extent of its capacity without any particular difficulty.

Reinforcement of Present Supply.

As previously stated the supply main of the new service can be readily connected with the present system of water works should these works be purchased by the city.

Your city engineer has prepared plans for reinforcing the old system so as to give an efficient fire service in the business district by laying a system of sub-mains on the avenues four or five blocks apart and connecting them with the distribution system. This will generally give the fire service required, although in some streets it will be necessary to increase the size of the distribution mains or to put in additional connecting pipes between the streets if it is expected to furnish a sufficient supply for a large fire.

Middle District.

The construction of the requirements of the middle district presents some difficulties. There are practically no pipes now laid in this district and but few of the streets where mains ought to be laid are graded. The present needs of the district are small and it is difficult to determine what the future growth may require. As nearly as I can determine there are not more than 1,000 buildings within the district where pipes would be laid within the next few years. I do not think that the domestic consumption of this system when the pipes are laid would exceed 250,000 gallons per day and the increase for the next five years will not probably be very rapid. The plans suggested by your engineer for this district are all right if the territory were thoroughly built up and the plant running at its fullest capacity, but they appear to me to involve too much expenditure for the present needs. The plan of laying the large mains on the upper level of the district is, I think, correct, but if built at the present time would involve a large expenditure without in any way increasing the revenue. I would therefore suggest the following system of mains as being ample for the requirements of this district for a long time and as having the advantage of being at once utilized for domestic and fire service for nearly the entire length. Lay a 20-inch force main from the low service reservoir to the middle service reservoir as proposed. Lay a 16-inch main on Woodland avenue from Victoria street to Fifth street, thence on Fifth street from Woodland avenue to Seventh avenue east from Fifth street to sixth street, thence on Sixth street from Seventh avenue east to Eighth avenue west.

In place of the large reservoir suggested for the middle service I would recommend that a small reservoir holding about 500,000 gallons be constructed at a cost of about $4,000 and placed at or near the site contemplated. This reservoir would serve as a standpipe and give a sufficient reserve supply until the reservoir as planned by your engineer is required. As this system supplies only a residential district there is not the importance of a large reserve supply that there is in the lower district which is more closely built up and contains all the business houses, hotels and large buildings, where a large supply is necessary for domestic use and fire service. I should estimate the cost of the main and reservoir at about $98,000, including valves and specials. The distribution system could be built up from this main system as the necessities require, placing 10 or 12-inch sub-mains about four blocks apart on the avenues and using 6-inch service mains on the streets connecting with the sub-mains. Whenever the 16-inch main as proposed proves insufficient for the service it can be reinforced by a main from the middle service reservoir on Dunedin avenue and Carvèr avenue extending to an intersection with Ninth street (or any other street as may seem best at the time) then paralleling the 16-inch main on Fifth Fifth and Sixth streets. Further reinforcement can be made by the same method if required and in this way the extensions and the expenditures will be made to conform to the growth of the city and the increase of revenue.

The pumping station would be located at the low service reservoir and to provide for an efficient fire service a compound condensing duplex pump of from 2,000,000 to 2,500,000 capacity would be ample for the first installment. The cost of such pump and boilers I should estimate at $15,000.

High Service System.

The only points on the high service system which require an immediate water supply are Woodland Park on the east and Duluth Heights on the west of the middle district.

These two localities are about four miles distant and should be supplied by two different systems as the present consumption would not warrant the expenditure necessary to lay a connecting pipe between the two points. Woodland Park has at the present time many fine residences and is undoubtedly destined to a large future growth as the population of Duluth increases, on account of i s excellent street car facilities. At the present time it would probably not require more than 12,000 gallons a day for the entire domestic supply. In the plans submitted it is proposed to put in a separate pumping plant at the middle service reservoir. That method would undoubtedly be the best if there were a large population, but with the small amount of water to be furnished I think it would be more economical to place a pump for this service in the pumping station at the low service reservoir and lay a separate 10-inch force main from the reservoir to Woodland avenue, thence extend the force main along Woodland avenue to a tank placed on a high elevation east of the Forest Hill cemetery in the same locality where the tank was contemplated to be placed in the plans prepared by the City Engineer, the elevation of the top of the water in the tank being 820 feet above the lake. The cost of the additional force main will be about $6,000, but it will save for a number of years the cost of erecting a new pumping station at the middle reservoir, and there can be a saving of about $1,500 a year in operating expenses, as no additional force will be required. The saving of interest in the separate plant and the saving in operating expenses will in a few years pay for the additional cost of the force main, and until the domestic consumption reaches 500,000 gallons per day it will be cheaper to operate in this way as for a long time it will only be necessary to run the pumps for a few hours each day. For this service I would recommend a duplex compound pump of about 1,000,000 capacity in order to give a good fire service, and when it becomes necessary to abandon this method a pump of this size can readily be utilized in another place. I should estimate the cost of the force main, pumping plant and tank to be about $40,000. The distribution system would of course be the same as under any other plan of pumping.

For the high service for Duluth Heights I do not see any better plan than that suggested by your Engineer. The domestic service at the present time is about the same as for Woodland Park and I am of the opinion that a 10-inch main instead of a 12-inch would be amply sufficient for the the service required. I would also suggest that for economy in operation arrangements might be made with the street car company by which the pumps could be located in their building at Ninth street and Seventh avenue west and could be operated for a few hours each day. If that could be done it would obviate the cost of erecting a pumping station and would reduce the cost of operating to a minimum, as the plant could undoubtedly be run with the same boilers and attendants that are used at the railway station. The water for this service could be taken from the 16-inch main on the middle service through a 12-inch pipe on Seventh avenue and pumped into a tank as indicated on the plans of your Engineer. I would estimate the cost of force main tank and pump at $37,000.

These changes that I have suggested in the middle and upper services will, I think, make a saving in the first cost of some $80,000 and at the same time the system will have an effective service without reinforcement for many years to come, depending of course on the future growth; also a saving of operating expenses in the two service systems of about $3,000 a year until the daily consumption on each service amounts to 500 000 gallons a day.

I submit the following as an estimate of cost of the work under these plans:

Cost of Middle Service.

6,100 feet of 20 inch force at $3.75	$ 22 875 00
21 150 feet of 16-inch main at $3 12	65,988 00
Reservoir	4.000 00
Pumping station	15,000 00
Pump and boilers	15,000 00
Valves and specials	5,000 00
Total	$127,863 00

High Service, Woodland Park.

3,750 feet of 10-inch force main at $1.50	5,625 00
12,100 feet of 10 inch main at $2.15	26.015 00
Tank	1,500 00
Pumping engine	7,500 00
Total	$ 40,640 00

High Service, Duluth Heights.

1,100 feet of 10-inch pipe (force main) at $2.15	$ 23,650 00
1.230 feet of 12-inch main (connecting 16-inch main with pump) at $2.50	3.075 00
Tank	3,00 00
Pump	7,000 00
Total	$ 36,725 00
Total cost of middle and high service	$205.228 00

I submit with the report maps showing the location of mains as specified above.

In conclusion I would say that the study of the plans and specifications as submitted by your City Engineer, Mr. Patton, show that they were prepared with care and careful attention to details and the suggestions that I have made for changes have been in the interests of economy in first construction, as on account of the necessarily expensive character of the work it will be some time before the income received from the middle and high service will pay the fixed charges and operating expenses.

Very respectfully submitted,
L. W. RUNDLETT,
Consulting Engineer.

CEMENT TESTS.

But little new work has been done in the matter of Cement Tests. The results of the year's work are clearly shown by the accompanying table.

As will be noted some very gratifying results have been secured in the tests of American Portland Cements; results in some cases equalling those obtained from the best brands of imported Portland Cement.

ESTIMATES.

Considerable time of the Department was taken up in making estimates for new work. The total amount of the estimates so made is $188,945.53, or exclusive of the waterworks, $80,389.37.

The total amount of work estimated for which contracts were let and on which work was started is $143,724.23, of which $8,988.23 is for work other than water works construction.

HOUSE NUMBER PLATS.

The work of preparing plats for the numbering of houses in that part of the city west of Twenty-eighth avenue west, is being prosecuted whenever time will permit and the plats are nearly completed.

The system of numbering which is proposed for those portions of the city, the platting of which is not in harmony with the main portion of the city, is of such a nature that the location of the houses will be indicated, not only with reference to the streets or avenues on which they stand, but also as regards the regularly platted streets and avenues of the city. For instance, in Walbanks Addition, the intersection of Winnipeg avenue and Exeter street corresponds nearly with the intersection of the prolonged lines of Fourth street and Twenty-ninth avenue west. In numbering this is assumed as the intersection of Twenty-ninth avenue west and Fourth street, so that the houses on Winnipeg avenue north of Exeter street will begin with numbers 401 and 402, and number to 425 and 426 at the corner of Wicklow street the first street north of Exeter street. As this intersection is below the prolonged line of Fifth street, the 400 numbers are continued to Wellington street, but starting on the north side of Wicklow street with numbers 451 and 452, the change of numbers from 425 and 6 to 451 and 2 indicating that a street has been crossed, to-wit: Wicklow street, Thus, any one having a number between 400 and 476 on Winnipeg avenue would know that it was on that portion of the street lying between the prolonged lines of Fourth and Fifth streets in the regular city platting. The houses on the streets will be numbered in a similar manner with regard to the avenues, thus: Starting at the same intersection at Winnipeg avenue and Exeter street, the houses on the west side of Winnipeg avenue will be numbered 2901 and 2902 and continued regularly to Michigan avenue, the first intersecting avenue, as this avenue is east of the prolonged line of Thirtieth avenue, the 2900 numbers are continued west of this avenue to Pacific avenue which is the next avenue. The houses on the west side of Michigan avenue, beginning with 2951 and 2952 indicating the crossing of the avenue. Thus: Any houses on Exeter street numbered 2901 or over would be known to lie on that street between the prolonged lines of Twenty-ninth and Thirtieth avenues west.

In the Oneota and West Duluth portions of the city, it is proposed to make Grand avenue the dividing line for numbering the avenues north and south, the streets being numbered between the avenues as in the central portion of the city.

OFFICE RECORDS.

The records of the office have been kept up during the year in a complete and satisfactory condition with the exception of some work on recording plats for which opportunity has not been found.

SPECIAL REPORTS.

During the year the City Council has called on me for estimates of the value of the plant of the Duluth Gas & Water Company, and also of the plant of the Duluth Water & Light Company. These estimates were carefully made and submitted to the proper authorities and are given in full below.

Estimate of value of the plant of the Duluth Gas & Water Co., for Committee of the Common Council.

Water Pipes in Entire System.

Lineal feet of Cast Iron Pipe Complete, Including Valves, Etc.	Price per Foot.	
8.262 4-inch	$1 30	$ 10,740 60
87,676 6-inch	1 75	153.433 00
16,049 8-inch	2 00	32,098 00
18,554 10-inch	2 30	42.674 20
16,573 12-inch	2 75	45,575 75
26.338 16-inch	3 25	85.598 50
7,744 20 inch	5 00	38,720 00
Total		$408 840 05

Lakeside Plant.

Pump house and well	$ 3.720 00
Pumps and boiler	2,500 00
36 hydrants	1,800 00
Intake pipe (no value.)	
Total	$ 8,020 00

Duluth Plant.

Intake pipe (really of no value)	$ 20,000 00
Pump house and well	12,000 00
Pumps and boilers	35,000 00
Reservoir, 4.5 million gallons capacity	30,000 00
Pavement repairs	54,000 00
Water meters in use	4,000 00
225 hydrants	11,250 00
Total	$166,250 00
Engineering incidentals, 15 per cent	$ 87,466 50

Gas Plant.

E H. Keating's estimate	$283.000 00
Add excavation, not included in above	58,000 00
Total	$341,000 00

Stock, Etc , on Hand.

Full value of previous estimate in 1891	$26,000 00

Real Estate.

Full amount, at market value, 1891	$76,780 00

Recapitulation

Value of water pipes	$ 408,840 05
Value of Lakeside plant	8,020 00
Value of Duluth plant	166,250 00
Value of gas plant	341,000 00
Stock, etc., on hand	26,000 00
Real estate	76,780 00
Engineering incidentals, 15 per cent	87,466 50
Total value plant of Duluth Gas & Water Co	$1,114,356 55

Estimate of value of plant of the Duluth Water and Light Company:

1,861	tons of cast iron pipe delivered at trenches	$23 00	per ton	$ 42,821 40
44.800	cubic yards of earth excavation	30	per cubic yard	13.440 00
400	cubic yards of rock excavation	4 00	per cubic yard	1,600 00
27	tons of lead	60 00	per ton	1,620 00
1	ton of yarn	05	per lb	100 00
32.5	tons of specials at trench	45 00	per ton	1,462 50
42,645.3	feet of 6-inch pipe laying	04	per foot	1 705 81
9.122.1	feet of 8-inch pipe laying	05	per foot	456 10
10,990.4	feet of 12-inch pipe laying	08	per foot	879 23
5,930.3	feet of 16 inch pipe laying	10	per foot	596 03
34	6-inch valves in place	11 00	each	374 00
8	8-inch valves in place	18 00	each	144 00
7	12-inch valves in place	30 00	each	210 00
3	16-inch valves in place	50 00	each	150 00
12	brick manholes at valves	25 00	each	300 00
170	hydrants in place	55 00	each	9,350 00
2.040	feet of 6-inch pipe for hydrant connection	75	per foot	1,530 00
1	stand pipe and connections			25 00
4.038.9	square yards of Macadam relaid	50	per sq. yd	2,019 45
12,937.1	square yards of cedar block relaid	60	per sq. yd	7,762 26
326.2	cubic yards of gravel	1 00	per cu. yd	326 20
32	hydrants not connected with main	45 00	each	1,440 00
	Engineering and incidentals, 10 per cent			8,831 19
				$ 97,143 17
	Interest on capital during construction at 6 per cent per annum			2,914 29
	Total			$100,057 46

ALLEY NAMES.

I recommend in my last annual report to your Honorable Body that steps be taken to secure the legal naming of the alleys of the city. In accordance with this recommendation I received from your Honorable Body an order for a list of names for the alleys. This list has been prepared and is ready for submission.

RECOMMENDATIONS.

I would respectfully call your attention to recommendations made in my last annual report to your Honorable Body and which have not yet received the favorable action of your Honorable Body, and which I beg leave to renew at this time.

All of which is respectfully submitted,

W. B. PATTON,
City Engineer.

ANNUAL REPORT

—OF THE—

Principal Assistant City Engineer

—FOR THE—

FISCAL YEAR ENDING FEBRUARY 28, 1897.

DULUTH, MINN., March 1st, 1897.

W. B. PATTON, ESQ.,
City Engineer.

DEAR SIR: In accordance with the usual custom, I herewith submit a report of the work done in this office for the year ending February 28, 1897.

Very little work was done this year in improving streets or building sewers. There was less work done in this line the past year than in any preceding year since 1886. As usual, a number of petitions for the improvement of streets were received, and estimates had to be made on these, but the number was less than heretofore. Much time was required in making duplicates of condemnation plats for the City Clerk. Work on the new Water Works was begun at the beginning of the fiscal year and most of the time of the office was occupied in making plans and estimates for this work.

A more detailed account of the work done by this Department will be found in the following statements:

Plans and specifications have been made for the following contracts which are now in progress or completed:

Street grading and paving	7
Sanitary sewers	2
Storm water sewers	..
Combined sewers	..
Sidewalks	27
Water Works	6
Miscellaneous	..
Total	42

Three copies of each of the above contracts have been made for record or use.

The amount of money expended on the above contracts is as follows:

Street grading and paving	$ 3,874 66
Sanitary sewers	576 84
Storm water sewers	
Combined sewers	
Sidewalks	4,536 73
Water Works	134.736 00
Miscellaneous	
Total	$143,724 23

In addition to the work done on the above contracts, estimates have been made for improvements which were not ordered. These estimates are classified as follows:

		Estimated Cost.
Grading,	5	$ 12,471 41
Paving,	1	42,944 00
Sewers,	1	477 73
Bridges,	5	15.508 00
Water Works,	3	273,820 16
Total		$345,221 30

The number of maps, plans, profiles, etc., has increased during the past year from 2,952 to 3,082. They are classified as follows:

Condemnations	45
Vacations	2
Profiles	28
Plans	32
Cross sections	3
Established grade profiles	14
Miscellaneous	6
Total	130

Condemnation plats for easements of slopes have been made along the following improved streets and alleys: The alley in block 70, Second Division, Duluth Proper, and Seventh alley, from Fifth avenue east to Sixth avenue east.

The following miscellaneous condemnation plats and vacation plats have been made:

LOCATION.	FROM	TO	DESCRIPTION.
Reservoir at 34th avenue east.........	....	....	Opening.
Spur track	D. & I. R. R. R.......	Pump house.........	Opening.
Approach to bridge between Rice's	Point and Con	nor's Point............	Opening.
Approach to bridge across St. Louis	River, Fond du Lac	....	Opening.
Road through Sec. 4 and 5, T. 48, R.	15, (Short Line	Park Road.)	Opening.
Grand avenue west	Grassy Point........	Ironton	Opening.
Streets to be opened near Reservoir	"A"	....	Opening.
Right-of-way for force main	Pump house.........	{ Lester Park, Fourth Division }	Opening.
Third Alley..	Piedmont ave W...	19th avenue west...	Vacating.

During the year there have been fifty permits and four extension permits issued to licensed drain layers to connect with the public sewers. The number issued up to date is 1,642. The amount of work done on each contract, and other information is given in the accompanying tables numbered from 1 to 7.

Table No. 8 shows the highest and lowest bids received on material from 1889 to the present time. Table No. 9 shows the results of cement tests made by Lyonel Ayres during the year. Table No. 10 gives the location of the monuments that have been set by the city. This last table has been corrected to date and a list of the monuments on Park Point has been added. These monuments were not set by the city but are used in its surveys. Table No. 11 gives the number of miles of street improvements which have been made in the city from 1886 to the present time.

The number of contracts let during the year was 42, which was 51 less than the number let the preceding year.

The amount of money expending on contracts, let during 1896, was $142,724.23, of which $134,733.00 was expended on Water Works. In 1895, $69,457.34 was expended on contract work let during that year.

The number of miles of streets improved reached a minimum this year—only 0.62 miles being improved, while in 1895—4.51 miles were improved. No storm sewers were built this year and only 0.07 miles last year.

In 1896, 0.20 miles of Sanitary Sewers were built and 0.34 miles in 1895.

4.34 miles of sidewalk were built in 1896 and 6.70 miles in 1895. The total length of improvements made on street work this year was 5.16 miles. Last year the number of miles improved was 13.05 miles.

All records of the office pertaining to contract work in hand or contemplated are filed.

The other records have been brought up to date as fast as possible.

Respectfully submitted,

E. J. DUFFIES,
Principal Assistant City Engineer.

TABLE NO. 1.

Bridge and Street Improvements.

The number of miles of streets improved reached a minimum this year—only 0.62 miles being improved, while in 1895—4.51 miles were improved. No storm sewers were built this year and only 0.07 miles last year.

In 1896, 0.20 miles of Sanitary Sewers were built and 0.34 miles in 1895.

4.34 miles of sidewalk were built in 1896 and 6.70 miles in 1895. The total length of improvements made on street work this year was 5.16 miles. Last year the number of miles improved was 13.05 miles..

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Respectfully submitted,

E. J. DUFFIES,
Principal Assistant City Engineer.

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TABLE NO. 2.

Sanitary Sewer Contracts.

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TABLE NO. 3.

Storm Sewer Contracts.

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TABLE NO. 4.

Description of Sanitary Sewers 1896

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TABLE NO. 5.

Description of Storm Sewers 1896.

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TABLE NO. 6.

Sidewalks Built During 1896.

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TABLE NO. 7.

Contracts Let During 1896.

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TABLE NO. 8.

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TABLE NO. 9.

of Cement Tests.

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TABLE OF MONUMENTS.

Table No. 10.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point
Name.	Line.	Name.	Line.		
Alder	Centre	Highland	Centre	Granite	Cross
Alder	"	Hugo st.	"	"	"
Anoka	"	Park	20 ft W of E line	Sandstone	"
Anoka	"	Allandale	Centre	"	"
Anoka	"	Woodland	"	"	"
†Avondale	"	54th East	"	Granite	Hole
†Avondale	"	58th East	"	"	Cross
Balsam	"	Highland	"	"	"
Banian	"	Highland	"	"	"
B. V. Terrace	South Line	Diamond	"	Stone	"
B. V. Terrace	South	Marshall	"	"	"
Birch	Centre	Cox	"	2 in iron pipe	Plug & Cross
Birch	"	Arthur	"	"	"
Cascade	Near Centre	24th West	"	Stone mon	Cross
Cascade	South	22nd West	"	Stone	"
Courtland	153.5 N. of N. line	26th West	"	"	"
Colorado	Centre	51st East	"	Granite	Copper bolt
Carlisle	*30 f S of C	Woodland	20 ft W of C	Sandstone	Hole
Carlisle	*60 ft S of C	Woodland	"	"	"
Cambridge	Centre	40th East	10 ft W of E	Granite	Copper bolt
Cambridge	"	43rd East	Centre	"	"
Cambridge	"	London road	"	"	"
Dodge	"	40th East	10 ft W of E	"	"
Dodge	"	43rd East	Centre	"	"
Dodge	"	45th East	"	"	"
Dodge	"	47th East	"	"	"
Dodge	"	48th East	"	"	"
Dodge	"	50th East	"	"	"
Dodge	"	51st East	"	"	"
†Eighth	"	28th West	East	"	Cross
†Eighth	"	16th West	"	"	"
†Eighth	25 ft S of C	Lake	25 ft W of C	"	"
†Eighth	"	10th East	"	"	"
†Eighth	Centre	19th East	East	"	"
†Eleventh	"	16th West	"	"	"
†Eleventh	25 ft S of C	Lake	25 ft W of C	"	"
†Eleventh	Centre	19th East	East	"	"
Euclid	"	Marshall	Centre	Stone	"
Euclid	"	Laurel	"	"	"
†First	25 ft S of C	25th West	25 ft W of C	Granite	"
†First	"	23rd West	"	"	"
†First	"	21st West	"	"	"
†First	"	19th West	"	"	"
†First	"	5th West	"	"	"
†First	"	3rd West	"	"	"
†First	"	1st West	"	"	"
†First	"	Lake	"	"	"
†First	"	1st East	"	"	"
†First	"	3rd East	"	"	"
†First	"	7th East	"	"	"
†First	"	9th East	"	"	"
†First	"	10th East	"	"	"
†First	"	15th East	"	"	"
†First	"	17th East	"	"	"
†First	Centre	19th East	East	"	Copper bolt
†First	"	24th East	"	"	Cross
†First	15 ft S of C	29th East	Centre	"	"
†First	"	30th East	"	"	"
†First	Centre	32nd East	"	"	"
†Fourth	"	28th West	East line	"	"
†Fourth	"	16th West	East	Ledge	"

TABLE OF MONUMENTS—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name	Line.	Name.	Line.		
†Fourth	25 ft S of C	10th West	25 ft W of C	Granite	Cross
†Fourth	"	8th West	"	"	"
†Fourth	"	6th West	"	"	"
†Fourth	33 27 N of C	5th West Mesaba	134.12 E of C Centre P. C	"	"
†Fourth	25 ft S of C	4th West	25 ft W of C	"	"
†Fourth	"	2nd West	"	"	"
†Fourth	"	Lake	"	"	"
†Fourth	"	4th East	"	"	"
†Fourth	"	6th East	"	"	"
†Fourth	"	8th East	"	"	"
†Fourth	"	10th East	"	"	"
†Fourth	"	12th East	"	"	"
†Fourth	"	14th East	"	"	"
†Fourth	"	19th East	"	"	"
†Fourth	"	18th East	"	"	"
†Fourth	Center	19th East	East	"	Copper bolt
Fourth	"	25th East	Centre	Sandstone	Hole
Fourth	"	26th East	220 ft E of C	"	Hole
†Fifth	"	28th West	East	Granite	Cross
†Fifth	"	16th West	East	Rock	"
†Fifth	25 ft N of C	13th West	25 ft W of C	Granite	"
†Fifth	"	11th West	"	"	"
†Fifth	"	9th West	"	"	"
†Fifth	"	7th West	"	"	"
†Fifth	"	5th West	"	"	"
†Fifth	"	3rd West	"	"	"
†Fifth	57.04 N of C	2nd West Mesaba	39.53 E of C Centre	"	"
†Fifth	25 ft N of C	1st West	25 ft W of C	"	"
†Fifth	"	Lake	"	"	"
†Fifth	"	1st East	"	"	"
†Fifth	"	3rd East	"	"	"
†Fifth	"	5th East	"	"	"
†Fifth	"	7th East	"	"	"
†Fifth	"	9th East	"	"	"
†Fifth	"	10th East	"	"	"
†Fifth	"	11th East	"	"	"
†Fifth	Centre	19th East	East	"	"
†4th ave W	East	Mesaba	Centre P. T	"	"
†Fourteenth	Centre	16th West	East	"	"
†Fourteenth	North	9th West	West	"	"
†Fourteenth	25 feet S of C	Lake	25 E of C	"	"
†Fourteenth	Centre	19th East	East	"	"
Forest	South	E Diamond	Centre	Stone	"
Forest	South	Diamond	"	"	"
†Faribault	30 ft S of C	Woodland	"	Sandstone	"
†Fifteenth	Centre	16th West	East	Granite	"
†Fifteenth	"	15th West	Centre	"	"
†Fifteenth	"	14th West	"	"	"
†Fifteenth	"	13th West	"	"	"
†Fifteenth	"	12th West	"	"	"
†Fifteenth	"	11th West	"	"	"
†Fifteenth	"	10th West	"	"	"
†Fifteenth	"	9th West	"	"	"
†Fifteenth	"	8th West	"	"	"
†Fifteenth	"	7th West	"	"	"
†Fifteenth	"	6th West	"	Ledge	"
†Fifteenth	"	5th West	"	Granite	"
†Fifteenth	"	4th West	"	"	"

TABLE OF MONUMENTS—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
†Fifteenth	Centre	3rd West	Centre	Granite	Cross
†Fifteenth	"	2nd West	"	"	"
†Fifteenth	"	1st West	"	"	"
†Fifteenth	"	Lake	"	"	"
†Fifteenth	"	1st East	"	"	"
†Fifteenth	"	2nd East	"	"	"
†Fifteenth	"	3rd East	"	"	"
†Fifteenth	"	4th East	"	"	"
†Fifteenth	"	5th East	"	"	"
†Fifteenth	"	6th East	"	"	"
†Fifteenth	"	7th East	"	"	"
†Fifteenth	"	8th East	"	"	"
†Fifteenth	"	9th East	"	"	"
†Fifteenth	"	10th East	"	"	"
†Fifteenth	"	11th East	"	"	"
†Fifteenth	"	12th East	"	"	"
†Fifteenth	"	13th East	"	"	"
†Fifteenth	"	14th East	"	"	"
†Fifteenth	"	15th East	"	"	"
†Fifteenth	"	16th East	"	"	"
†Fifteenth	"	17th East	"	"	"
†Fifteenth	"	18th East	"	"	"
†Fifteenth	"	19th East	East	"	"
†Garfield Ave	25 ft E of C	Ash	25 ft S of C	"	"
†Garfield Ave	"	Birch	"	"	"
†Garfield Ave	"	Nelson	"	"	"
†Garfield Ave	"	Elm	"	"	"
†Garfield Ave	"	Lynn	"	"	"
†Garfield Ave	"	Oie	"	"	"
†Garfield Ave	"	Maple	"	"	"
†Grand Ave E	North	54th East	East	"	Hole
†Grand Ave E	"	57th East	Centre	"	"
†Glendale st	South	57th East	"	"	"
†Glenwood st	Centre	58th East	"	"	Copper bolt
†Juniata	"	58th East	"	"	Cross
†Lake Ave		Mesaba	Centre, at An. Pt	"	"
†Lake Ave S	20 ft E of C	Sutphin st	"	"	"
†Lake Ave S	"	Buchanan st	"	"	Copper bolt
†Lake Ave S	"	Morse st	"	"	"
†London R	20 ft S of C	10th East	25 ft W of C	"	"
†London R	"	12th East	"	"	"
†London R	"	14th East	"	"	"
†London R	"	15th East	"	"	"
†London R	"	16th East	"	"	"
†London R	"	17th East	"	"	"
†London R	"	18th East	"	"	"
†London R	"	19th East	"	"	"
†London R	"	20th East	"	"	"
†London R	"	21th East	"	"	"
†London R	"	22th East	"	"	"
†London R	"	23th East	"	"	"
†London R	"	24th East	"	"	"
†London R	"	25th East	"	"	"
†London R	"	26th East	West	"	Cross
†London R	"	27th East	25 ft W of C	"	"
†London R	"	28th East	"	"	"
†London R	"	29th East	"	"	"
*London R	"	30th East	"	"	"
†London R	"	31st East	"	"	"
†London R	"	32nd East	"	"	"
†London R	"	33rd East	"	"	"

TABLE OF MONUMENTS—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
†London Road	20 ft S of C	34th East	25 ft W of C	Granite	Cross
†London Road	"	35th East	"	"	"
†London Road	"	36th East	"	"	"
†London Road	"	37th East	"	"	"
†London Road	"	38th East	"	"	"
†London Road	"	39th East	"	"	"
†London Road	Centre	40th East	69.30 W of E	"	Copper bolt
†London Road	"	43rd East	63.45 W of C	"	"
†London Road	"	46th East	52 06 W of C	"	"
†London Road	"	47th East	8 56 W of C	"	"
†London Road	"	48th East	123 7 E of C	"	"
‡London Road	"	Angle n'r 51st East		"	"
†London Road	"	Angle n'r 52nd East		"	"
†London Road	"	54th East	East	"	"
†London Road	"	55th East	Centre	"	"
†London Road	"	56th East	"	"	"
†London Road	"	57th East	"	"	"
†London Road	"	58th East	"	"	"
†London Road	"	59th East	"	"	"
†London Road	"	60th East	"	"	"
Locust	"	Ebony	"	"	Cross
Locust	"	Hugo street	"	"	"
Lewis	*143 S of C	Woodland	30 ft W of C	Sandstone	Hole
Mankato	*South at B C	Woodland	Centre	"	Cross
Mankato	*North at B C	Woodland	"	"	"
Martin	100 ft S of S	26th West	"	Stone	"
Mulberry	Centre	Ebony	"	Granite	"
Myrtle	"	Highland	"	"	"
Myrtle	"	Ebony	"	"	"
†Michigan	"	35th West	Nr W city limits	"	Copper bolt
†Michigan	"	28th West	East line	"	"
†Michigan	20 ft S of C	13th West	25 ft W of C	"	"
†Michigan	"	12th West	"	"	"
†Michigan	"	11th West	"	"	"
†Michigan	"	10th West	"	"	"
†Michigan	14 ft N of C	8th West	25 ft E of C	"	"
†Michigan	"	7th West	25 ft W of C	"	"
†Michigan	"	5th West	"	"	"
†Michigan	"	3rd West	"	"	"
†Michigan	"	1st West	"	"	"
†M'Culloch ave.	Centre	40th East	10 ft W of E	"	"
†M'Culloch ave.	"	43rd East	Centre	"	"
†M'Culloch ave.	"	47th East	"	"	"
Marks	South	Piedmont W	"	Stone	Cross
Marks	"	E Diamond	"	"	"
Nelson	Centre	Cox	"	2 in. iron pipe	Plug & Cross
Nelson	"	Arthur	"	"	"
†Ninth	"	28th West	East	Granite	Cross
†Ninth	"	16th West	"	"	"
†Ninth	25 ft S of C	Lake	25 ft W of C	"	"
†Ninth	"	10th East	"	"	"
†Ninth	Centre	19th East	East	"	"
†Oakley	"	54th East	Centre	"	Hole
†Oakley	"	58th East	"	"	Cross
†Oneida	"	54th East	"	"	"
†Oneida	"	57th East	"	"	"
†Oneida	"	58th East	"	"	Copper bolt
†Oneida	"	60th East	"	"	Cross
†Otsego	"	54th East	"	"	"

TABLE OF MONUMENTS.—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name,	Line.		
Orange	South	Highland	East	Granite	Cross
Orange	“	Ebony	“	“	“
Oxford	*150 ft N of C	Woodland	30 ft W of C	Sandstone	Hole
†Piedmont ave	20 ft S of C	Near 9th W	At end of curve	Granite	Copper bolt
Porter ave	Centre	Blackman	Centre	Sandstone	Cross
Porter ave	6.4 ft N of C	Sawyer	0.1 W of C	“	“
†Pitt	Centre	40th East	29 ft W of E	Granite	Copper bolt
†Pitt,	“	43rd East	Centre	“	“
†Pitt,	“	47th East	“	“	“
†Pitt	“	50th East	“	“	“
Palmetto	South	Highland	East	“	Cross
Palmetto	“	Ebony	“	“	“
Railroad	Centre	Lake	Centre	“	“
Richardson	South	Voss	“	“	“
Ruthvin	*310 ft S of C	Woodland	30 ft W of C	Sandstone	Hole
Ruthvin	*330 ft N of C	Woodland	“	“	“
†St. Croix ave	Centre	Sutphin st	Centre	Granite	Cross
†St. Croix ave	“	Ang N of Bucha'n		“	“
St. Marie	“	Woodland	*5 ft W of C	Sandstone	Hole
St. Marie	“	Carver	Centre	“	“
St. Marie	“	Sawyer	1.9 E of C	“	Cross
St. Marie	“	Blackman	Centre	“	“
Second Div. Woodland	South	Woodland	“	“	Hole
†Second	Centre	28th West	East	Granite	Cross
†Second	25 ft S of C	26th West	25 ft W of C	“	“
†Second	“	24th West	“	“	“
†Second	“	22nd West	“	“	“
†Second	“	20th West	“	“	“
†Second	Centre	16th West	East	“	“
†Second	25 ft S of C	6th West	25 ft W of C	“	“
†Second	“	4th West	“	“	“
†Second	“	2nd West	“	“	“
†Second	“	Lake	“	“	“
†Second	“	2nd East,	“	“	“
†Second	“	4th East	“	“	“
†Second	“	6th East	“	“	“
†Second	“	8th East	“	“	“
†Second	“	10th East	“	“	“
†Second	“	12th East	“	“	“
†Second	“	14th East	“	“	“
†Second	“	16th East	“	“	“
†Second	“	18th East	“	“	“
†Second	Centre	19th East	East	“	“
†Seventh	“	28th West	“	“	“
†Seventh	“	16th West	“	“	“
†Seventh	25 ft S of C	Lake	25 ft W of C	“	“
†Seventh	“	10th East	“	“	“
†Seventh	Centre	19th East	East	“	“
†Sixth	“	28th West	“	Boulder	“
Sixth	“	27th West	Centre	Granite	“
†Sixth	“	16th West	East	Ledge	“
†Sixth	25 ft S of C	Lake	25 ft W of C	Granite	“
†Sixth	“	10th East	“	“	“
†Sixth	Centre	19th East	East	“	“
Sixth	North	25th East	“	“	“
Sixth	“	27th East	“	“	“
Sixteenth	South	17th West	“	Stone	Hole
†Sixteenth	Centre	16th West	“	Granite	Cross
Sixteenth	South	10th West	West	Stone	“

TABLE OF MONUMENTS.—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.			
Name.	Line.	Name.	Line.	Material.	Point.
Sixteenth	South	9th West	West	Ledge	Cross
Sixteenth	"	2nd West	East	Sandstone	"
†Sixteenth	Centre	19th East	"	Granite	"
†Superior	20 ft S of C	31st West	25 ft W of C	"	Copper bolt.
†Superior	"	30th West	"	"	"
†Superior	"	29th West	"	"	"
†Superior	"	28th West	East	"	"
†Superior	"	27th West	25 ft W of C	"	"
†Superior	"	26th West	"	"	"
†Superior	"	25th West	"	"	"
†Superior	"	24th West	"	"	"
†Superior	"	23rd West	"	Boulder	"
†Superior	"	22nd West	"	Granite	"
†Superior	"	21st West	"	"	"
†Superior	"	20th West	21 ft W of C	"	"
†Superior	"	19th West	25 ft W of C	"	"
†Superior	"	18th West	"	"	"
†Superior	"	17th West	"	"	"
†Superior	"	16th West	East	"	"
†Superior	Centre	8th W & Mesaba	Centre	" "	" "
†Superior	20 ft S of C	7th West	25 ft W of C	"	"
†Superior	"	6th West	"	"	"
†Superior	"	5th West	"	"	"
†Superior	"	4th West	"	"	"
†Superior	"	3rd West	"	"	"
†Superior	"	2nd West	"	"	"
†Superior	"	1st West	"	"	"
†Superior	"	Lake	Centre	"	"
†Superior	"	1st east	25 ft W of C	"	"
†Superior	"	2nd East	"	"	"
†Superior	"	3rd East	"	"	"
†Superior	"	4th East	"	"	"
†Superior	"	5th East	"	"	"
†Superior	"	6th East	"	"	"
†Superior	"	7th East	"	"	"
†Superior	"	8th East	47 34 ft W of C	"	"
†Superior	6 ft N of S	9th East	25 ft W of C	"	"
†Superior	"	10th East	"	"	"
†Superior	"	12th East	"	"	"
†Superior	"	13th East	"	"	"
†Superior	"	14th East	"	"	"
†Superior	"	15th East	"	"	"
†Superior	"	16th East	"	"	"
*Superior	"	17th East	"	"	"
†Superior	"	18th East	"	"	"
†Superior	"	19th East	"	"	"
†Superior	"	20th East	"	"	"
†Superior	"	21st East	"	"	"
†Superior	"	22nd East	"	"	"
†Superior	"	23rd East	"	"	"
†Superior	"	24th East	"	"	"
†Superior	"	25th East	"	"	"
†Superior	"	26th East	"	"	"
†Superior	"	27th East	"	"	Cross
†60th ave East	Centre	58th East	"	"	"
†Tioga St	"	54th East	Centre	"	Hole
†Third ave W	"	Mesaba	Centre, P. C	"	Cross
†Third St	"	28th West	East	"	"
†Third	25 ft S of C	27th West	25 ft W of C	"	"
†Third	"	25th West	"	"	"

TABLE OF MONUMENTS—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
†Third	25 ft S of C	23rd West	25 ft W of C	Granite	Cross
†Third	“	21st West	“	“	“
†Third	Centre	16th West	East	“	“
†Third	25 ft S of C	13th West	25 ft W of C	“	“
†Third	“	11th West	“	“	“
†Third	“	9th West	“	“	“
†Third	“	7th West	“	“	“
†Third	“	5th West	“	“	“
†Third	“	3rd West	“	“	“
†Third	“	1st West	“	“	“
†Third	“	Lake	“	“	“
†Third	“	1st East	“	“	“
†Third	“	3rd East	“	“	“
†Third	“	5th East	“	“	“
†Third	“	7th East	“	“	“
†Third	“	10th East	“	“	“
†Third	“	11th East	“	“	“
†Third	“	13th East	“	“	“
†Third	“	15th East	“	“	“
†Third	“	17th East	“	“	“
†Third	Centre	19th East	East	“	Copper bolt
†Thirteenth	“	16th West	“	“	Cross
†Thirteenth	“	5th West	0 05 W of C	Sandstone	Hole
†Thirteenth	25 ft S of C	Lake	25 ft W of C	Granite	Cross
†Thirteenth	Centre	19th East	East	“	“
†Tenth	“	28th West	“	“	“
†Tenth	“	27th West	Centre	“	“
†Tenth	“	26th West	“	“	“
†Tenth	“	25th West	“	“	“
†Tenth	“	24th West	“	“	“
Tenth	“	19th West	288 ft W of C	Stone	“
†Tenth	“	16th West	East	Granite	“
Tenth	“	8th West	Centre	Sandstone	“
Tenth	“	6th West	“	“	“
Tenth	“	5th West	“	Granite	“
†Tenth	25 ft S of C	Lake	25 ft W of C	“	“
†Tenth	“	10th East	“	“	“
†Tenth	Centre	19th East	East	“	“
Twelfth	North	17th West	“	“	Hole
†Twelfth	Centre	16th West	“	“	Cross
Twelfth	*200 ft S of C	5th West	Centre	Sandstone	Hole
†Twelfth	25 ft S of C	Lake	25 ft W of C	Granite	Cross
†Twelfth	Centre	10th East	East	“	“
†Twelfth	“	19th East	“	“	“
Union	“	Beltrami	Centre	Sandstone	Hole
Union	“	13th West	“	“	“
Victoria	South	Woodland	30 ft W of C	“	“
Victoria	Near North	Woodland	30 ft E of C	“	“
Victoria	Centre	Essex	96 ft W of C	“	“
Victoria	“	Carver	Centre	“	“
Wabasha	*W line B C	Woodland	“	“	Cross
Wabasha	E C	Woodland	“	“	“
Winona	*50 ft S B C	Woodland	“	“	“
Winona	*—ft N E C	Woodland	“	“	“
Wyoming	Centre	54th East	“	Granite	Hole
Wyoming	“	58th East	“	“	Cross

† Monuments are correct—established by the City.

* Means more or less.

TABLE OF MONUMENTS IN FOND DU LAC.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE,			
Name.	Line.	Name.	Line.	Material.	Point.
Algonquin	15 ft N of S	W L of Village		Wood	
Algonquin	"	131st Ave W	20 ft E of W	Stone	
Algonquin	"	130th "	"	Wood	
Algonquin	"	129th "	"	"	
Algonquin	"	128th "	"	"	
Algonquin	"	127th "	"	"	
Algonquin	"	E L of Village		"	
Bishop	"	130th Ave W	20 ft E of W	In River	
Bishop	"	129th "	"	Wood	
Bishop	"	E L of Village		"	
Callowhill	"	W L of Village		"	
Callowhill	"	131st Ave W	20 ft E of W	Stone	
Callowhill	"	130th "	"	"	
Callowhill	"	129th "	"	Wood	
Callowhill	"	128th "	"	"	
Callowhill	"	126th "	"	"	
Callowhill	"	E L of Village		"	
Cherokee	"	W L of Village		"	
Cherokee	"	134th Ave W	20 ft E of W	Wood	
Cherokee	"	133rd "	"	Stone	
Cherokee	"	132nd "	"	"	
Cherokee	"	131st "	"	"	
Cherokee	"	130th "	"	"	
Cherokee	"	129th "	"	"	
Cherokee	"	128th "	"	Wood	
Cherokee	"	127th "	"	"	
Choctaw	"	W L of Village		"	
Choctaw	"	134th Ave W	20 ft E of W	Stone	
Choctaw	51.9 ft N of S	129th "	49.3 ft E of W	"	¼ Sec Corner
Choctow	15 ft N of S	132nd "	20 ft E of W	"	
Choctaw	"	131st "	"	"	
Choctaw	"	130th "	"	"	
Choctaw	"	129th "	"	"	
Choctaw	"	128th "	"	"	
Choctaw	"	126th "	"	Wood	
Choctaw	"	E L of Village		"	
Custer	"	W L of Village		"	
Custer	"	134th Ave W	20 ft E of W	Stone	
Custer	"	133rd "	"	Wood	
Custer	"	132nd "	"	Stone	
Custer	"	131st "	"	"	
Custer	"	130th "	"	"	
Custer	"	129th "	"	"	
Custer	"	128th "	"	"	
Custer	"	127th "	"	"	
Custer	"	126th "	"	"	
Custer	"	E L of Village		"	
Gasper	"	W L of Village		"	
Gasper	"	134th Ave W	20 ft E of W	"	
Gasper	"	133rd "	"	"	

TABLE OF MONUMENTS IN FOND DU LAC—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
Gasper	North	133rd West	West	Stone	Orig. monu't
Gasper	15 ft N of S	132nd West	20 ft E of W	“	
Gasper	“	131st West	“	“	
Gasper	“	130th West	“	“	
Gaspe	“	129th West	“	“	
Gasper	“	128th West	“	Wood	
Gasper	“	127th West	“	“	
Gasper	“	126th West	“	“	
Gasper	“	E line of Village		“	
Glass	“	W line of Village		“	
Glass	“	134th West	20 ft E of W	Stone	
Glass	South	133rd West	West	“	
Glass	15 ft N of S	132nd West	20 ft E of W	“	
Glass	“	131st West	“	“	
Glass	“	130th West	“	“	
Glass	“	129th West	“	“	
Glass	“	128th West	“	Wood	
Glass	“	127th West	“	“	
Glass	“	126th West	“	Stone	
Glass	“	E line of Village		“	
Hollenbeck	“	W line of Village		Wood	
Hollenbeck	“	134th West	20 ft E of W	Stone	
Hollenbeck	“	132nd West	“	“	
Hollenbeck	“	131st West	“	“	
Hollenbeck	“	129th West	“	“	
Hollenbeck	“	128th West	“	“	
Hollenbeck	“	127th West	“	Wood	
Hollenbeck	“	126th West	“	“	
Hollenbeck	“	E line of Village		“	
Itasca	“	130th West	20 ft E of W	In Water	
Itasca	“	129th West	“	Wood	
Itasca	“	128th West	“	“	
Krumseig	“	130th West	“	“	
Krumseig	“	129th West	“	“	
Miles	“	W line of Village		Stone	
Miles	“	131st West	20 ft E of W	“	
Miles	“	130th West	“	“	
Miles	“	129th West	“	“	
Miles	“	128th West	“	Wood	
Miles	“	127th West	“	“	
Mohawk	“	130th West	“	“	
Oconomowoc	“	128th West	“	“	
Oconomowoc	“	127th West	“	“	
Pembina	“	129th West	“	“	
Pembina	“	128th West	“	In Water	
Pembina	“	127th West	“	“	
Pembina	“	126th West	“	Wood	
Pembina	“	E line of Village		“	
Seneca	“	129th West	20 ft E of W	“	
Seneca	“	128th West	“	“	
Seneca	“	127th West	“	“	
Seneca	“	126th West	“	“	
Seneca	“	E line of Village		“	

TABLE OF MONUMENTS IN FOND DU LAC—Continued.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
Tecumseh	East	Bishop St.	North	Wood	
Tecumseh	"	Oconomowoc St	North	"	
Tecumseh	15 ft N of South	128th West	20 ft E of W	"	
Tecumseh	"	127th West	"	"	
N E Corner of Village Plat				"	
N W Corner of Village Plat				"	
N L of Village		131st West	20 ft E of W	Stone	
N L of Village		130th West	"	Wood	
N L of Village		129th West	"	"	
N L of Village		128th West	"	"	
N L of Village		127th West	"	"	

One at section corner of 5-6-7 8, T. 48 R 15 W., said section corner being 57 6 feet southerly, 172.7 feet west of stone monument set at intersection of Hollenbeck street and 134th Avenue West, and being 2,634.18 feet west of quarter section corner between sections 5 and 6. Material, stone.

One on section line between sections 7 and 8 T. 48 N . R. 15 W., 1,355.3 feet south of above section corner and being 271 8 feet south of intersection of line between monuments upon 134th Avenue West; said point of intersection is 73 feet north of wooden monument upon Cherokee street and 134th Avenue West, and the angle between section line and street line is nine (9) degrees and eighteen (18) minutes. Material, stone

TABLE OF MONUMENTS.

Park Point.

LOCATION.				DESCRIPTION.	
STREET.		AVENUE.		Material.	Point.
Name.	Line.	Name.	Line.		
Fulton	South Line	Lake	15 ft E of W Line	Granite	Hole
Olive	"	Lake	15 ft "	"	"
Olive	North Line	Lake	East Line	Sandstone	"
Olive	"	Minnesota	Centre Line	"	"
Astor	South Line	Lake	15 ft E of W Line	Granite	"
Argyle	"	Lake	15 ft "	"	"
Cherry	"	Lake	15 ft "	"	"
Sorenson	"	Lake	15 ft "	"	"
St. John	"	Minnesota	15 ft W of E Line	"	"
Montana	"	Minnesota	15 ft "	"	"
Church	"	Minnesota	15 ft "	"	"
New York	"	Minnesota	15 ft "	"	"
Erie	"	Minnesota	15 ft "	"	"
Monroe	"	Minnesota	15 ft "	"	"
Clark	"	Minnesota	15 ft "	"	"
Williams	"	Minnesota	15 ft "	"	"
St. Cloud	"	Minnesota	15 ft "	"	"
Pine	Centre Line	Minnesota	Centre Line	Sandstone	"
60 ft S of S Lot Plat		Minnesota	15 ft W of E Line	Granite	"
S Line of Lower Duluth		Minnesota	Centre Line	Sandstone	"
S Line of Lower Duluth		Lake	East Line	"	"

TABLE NO. 11.

Table Showing Number of Miles Sewer and Street Improvements from 1886 to Present Time, Including Alleys.

	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	Total
Streets graded.......	3.82	13.78	12.72	7.40	10.70	16.30	12.91	25.31	7.14	0.26	....	111.34
Streets graveled......	....	11.44	3.40	6.39	9.30	7.60	2.47	6.62	3.60	4.22	0.29	55.24
Streets macadamized....................	....	0.84	1.10	1.40	2.30	6.08	6.06	5.25	0.50	....	....	23.53
Streets paved...	....	0.71	1.50	1.40	3.40	3.70	2.70	6.23	0.10	....	0.33	20.07
Storm sewers constructed.............	....	....	3.04	2.94	2.04	3.40	0.73	1.82	0.59	0.07	....	14.63
Sanitary sewers constructed........	1.61	6.34	4.26	3.66	3.18	5.90	7.85	3.15	0.34	1.77	0.20	38.26
Sidewalks built.....	14.15	9.71	9.50	15.34	12.82	10.62	6.74	36.26	8.58	6.70	4.34	134.76

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